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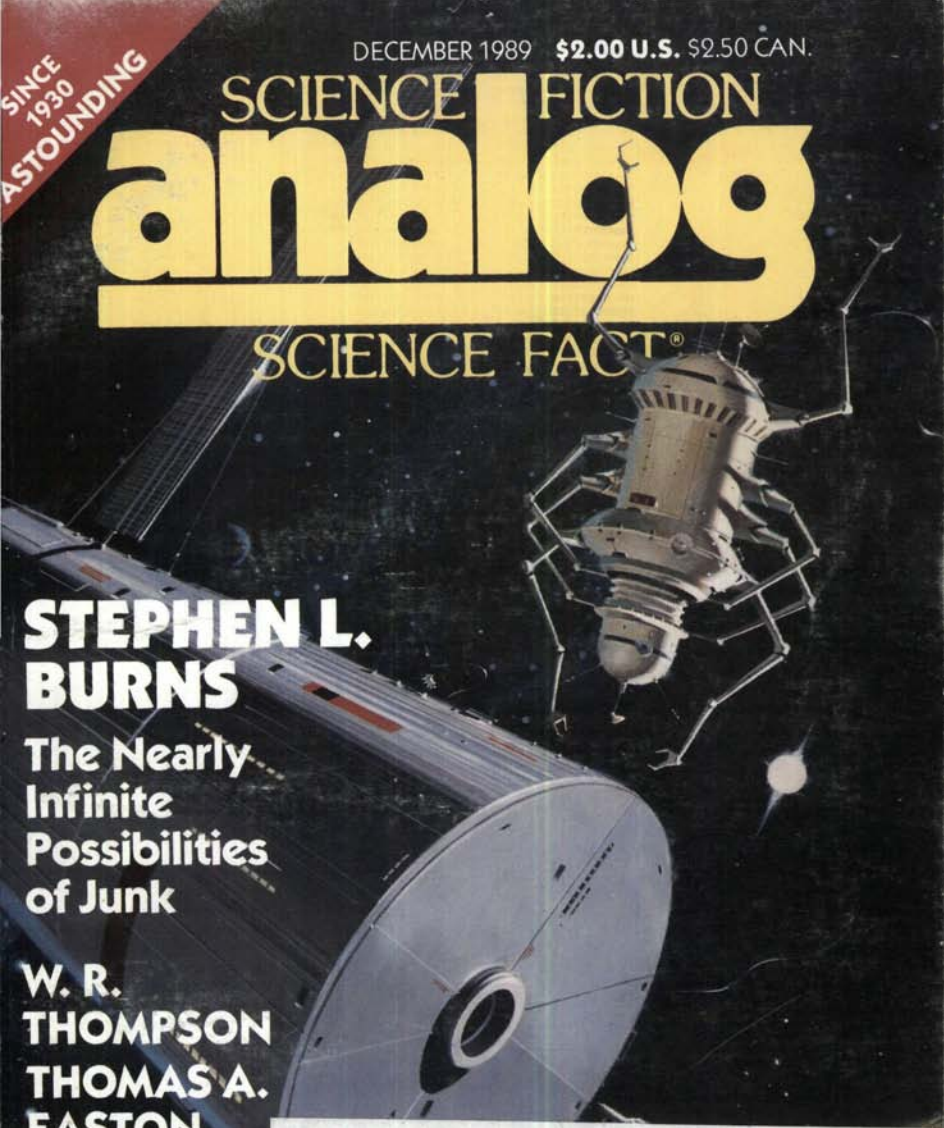

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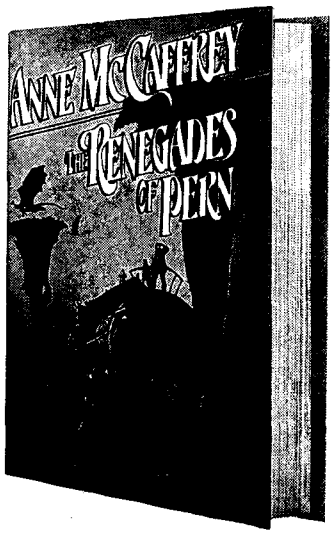

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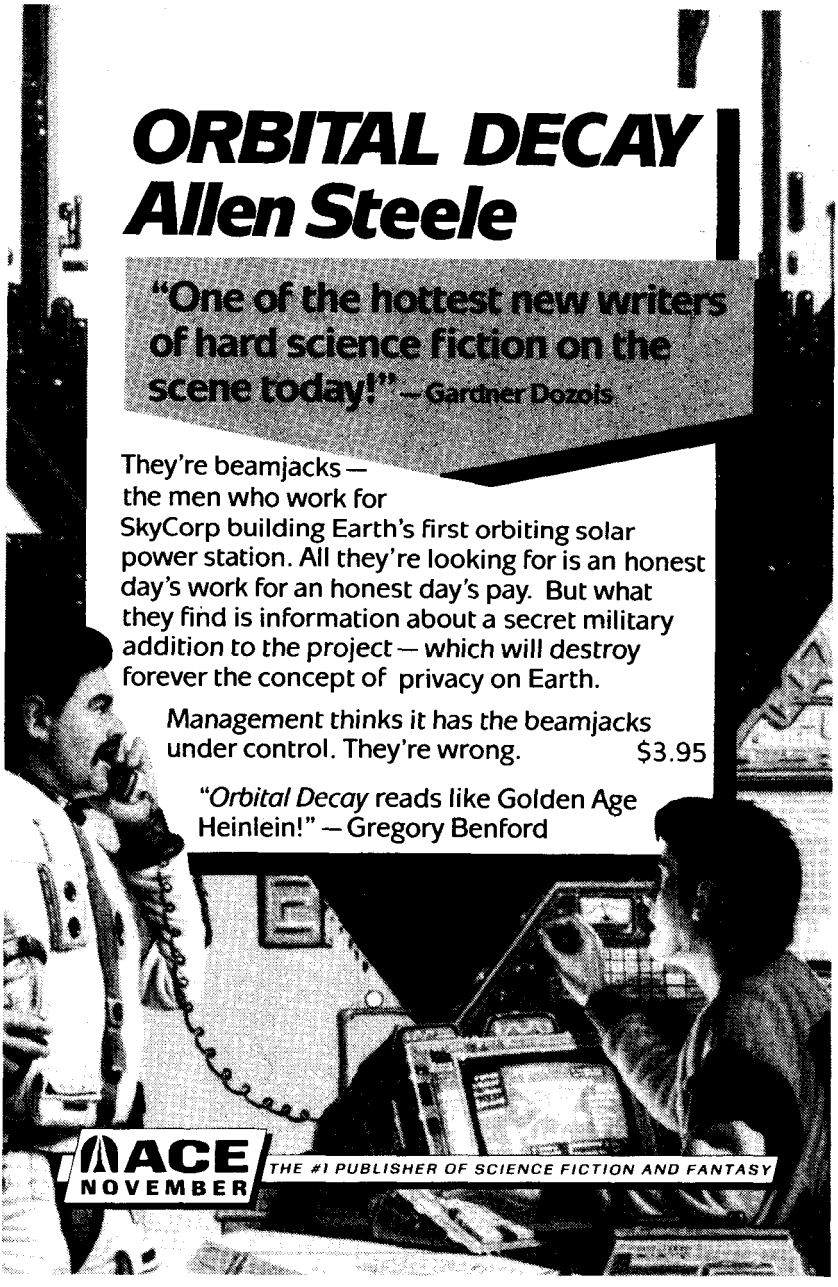
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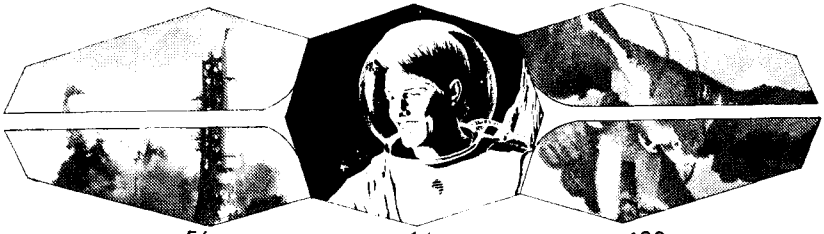

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Guest Editorial

THE WEALTH OF GALAXIES

Warren Salomon

"The colony of a civilized nation which takes possession either of a waste country, or of one so thinly inhabited, that the natives easily give place to the new settlers, advances more rapidly to wealth and greatness than any other human society."

—Adam Smith,
The Wealth of Nations

"With a third or half a trillion stars in our Milky Way Galaxy alone, could ours be the only one accompanied by an inhabited planet?"

—Carl Sagan,
Cosmos

* * *

"Where are they?"

—Enrico Fermi, unpublished (but much noted) conversational remark

The existence of intelligent, star-traveling aliens in this galaxy may ultimately affect our future more than any other factor you can name, just as the existence of ocean-traveling Europeans affected the destiny of America's unsuspecting Indians.

Therefore, one of the most fascinating—and recurring—topics in magazines such as this is our rapidly growing astonishment at the apparent absence of any evidence of extra-terrestrials.

As a practical matter, this subject began when radio astronomer Frank Drake of Cornell University wrote out

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an equation describing (some of) the major factors affecting the number of intelligent alien species that might exist and be available for contact at any particular time. The factors in Drake's equation (also known as the Green Bank formula) are the ones you've come to expect—how many stars exist, how many have habitable planets, how common is life, intelligence, technology, etc.

Based on what's been discovered lately, some scientists (like Carl Sagan) have estimated that there could be *several million* intelligent species in our own galaxy right now. Further, it appears there's been more than enough time for numerous species to have already expanded (or at least sent probes) everywhere—from one edge of our galaxy to the other.

Therefore, we shouldn't have this galaxy (or even Earth!) all to ourselves. But we've had no visitors; we've heard no signals. If there are so many intelligent species out there, then . . . as Enrico Fermi once asked, "Where are they?" The problem is now known as Fermi's Paradox, or more poignantly, the Great Silence.

Some have argued that the absence of any trace of aliens "proves" that we are the galaxy's Elder Race. If these so-called contact pessimists are right, we face the stars somewhat like the first Indians who, searching for the source of the sunrise, trekked across the now-vanished land bridge from Siberia to Alaska, and unwittingly found themselves the most fortunate humans who ever lived—sole owners of a lush, virgin hemisphere (and about whom we'll have more to say later).

The contact pessimists aren't necessarily glum about mankind's destiny, just the prospects for alien contact. It's not a pessimistic future, really, to be the sole owners of our galaxy; but it's disappointing to those who want the supposedly stimulating company of other star-traveling species.

On the other hand, if the contact *optimists* are right, and if the galaxy is full of intelligent aliens (who somehow never contact us), we could be facing a "good news, bad news" situation. The good news about an alien-filled galaxy is that our future can be a grand, glorious, endlessly variable adventure. The bad news is that we're the newcomers in an old and already well-settled galaxy, so all the best opportunities may have already been taken, millions (or billions) of years ago, leaving us with only scraps from the table of the Great Ones.

As Arthur C. Clarke put it in *The Promise of Space*, "If ships from Earth ever set out to conquer other worlds, they may find themselves, at the end of their journeys, in the position of painted war canoes drawing slowly into New York harbor."

That is not the way we'd like the future to unfold. Instead of being aborigines, we'd rather be lords of the galaxy, from arm to shining arm, without serious competition.

Wouldn't it be great if we could have it both ways—if we could have our aliens, as the contact optimists prefer (and as the Drake formula now seems to predict), and still somehow avoid being an inferior species in a densely populated

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galaxy? Is such a "good news, good news" scenario possible?

Not really, according to the long, woeful list of excuses for the Great Silence presented in most of the literature on this subject. Typical "optimistic" explanations for why we're being left alone are: the aliens are avoiding us, or blockading us, or they're too advanced for us, etc. Pretty grim stuff, this contact optimism (although David Brin showed true optimism in his excellent article in the July 1985 issue of this magazine).

But think about it—is the case of the contact optimists really believable? Does it make sense that there are millions of intelligent species out there, loads of whom have been around for millions of years, but somehow, for what seem to be painfully contrived excuses, absolutely no one is willing (or able) to get from there to here? Surely the wretched batch of alibies we've been offered can't account for our total isolation. But

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then . . . what does?

In the May 1989 issue of *Analog*, in an article titled "The Economics of Interstellar Commerce," I explained that even if there were no technological barriers to star travel, a species nevertheless needs economic incentives to build ships and go voyaging to other stars. The investment required for star travel is huge; the payoff is centuries (or at best, decades) away. Why would any species bother with such a costly activity, except perhaps for the extravagance of a few exploratory ships?

The only motivation I could think of to justify the multi-generational expense of establishing extra-solar colonies would be the combined benefits to be derived from time dilation and compound interest.

Greatly simplified, my idea was this: What will ultimately lure investors' money into building starships won't be the stars, it'll be superfast compound interest (relativistically speaking). Your Earth-bound bank account, piling up interest over the decades, would make you rich when you returned, still young, after a long interstellar voyage. (This is relativity's famous "twin paradox," applied to you and your bank account.) I predicted that it would probably be star-traveling (and thus long-lived) bankers who found it profitable to invest in starting mankind's interstellar expansion. Only after the passage of centuries might other activities justify the continuing expense of maintaining fleets of starships.

And if I'm right about this, then we may *seem* to be alone for a very understandable reason—no other species has developed our free enterprise, profit-seeking motivation.

To prove my point about the primacy of economics, consider the sad status of SETI—the Search for Extra-Terrestrial Intelligence. SETI is cheap; all it really requires is off-the-shelf radio technology. Yet in the absence of a profit motive, we can't even keep SETI afloat. You can imagine, therefore, how impossible it would be to raise funds for a fleet of non-profit starships—even if they weren't all that difficult to build.

I don't want to minimize the technological end of things, but interstellar travel really boils down to this: Assuming a species' engineers can do the job, economics is the whole ball of wax.

Could economics be the key missing factor in the Drake equation, as well as an explanation for the Great Silence? Drake himself suspects something like this [Reference 7]. Could this explanation apply to *every* intelligent species in the galaxy? I think so. Consider this:

What does it take to develop our particular brand of economic incentives? It requires that a species generate several *intellectual* concepts, and that they take each of these concepts seriously. At minimum, they need: (1) private property; (2) money; (3) interest; (4) commercial banking; (5) merchant banking; (6) joint-stock companies; (7) financial markets; (8) accounting systems; and (9) a free-market economic system.

Observe that none of these requirements is an engineering development. None is a tangible technological achievement. Each is invisible, intangible, and abstract. None is inevitable. Therefore, it seems probable that our

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system of economic incentives is far from being universal; it could actually be unique to us, and incomprehensibly "alien" to other species in our galaxy.

We have no difficulty assuming that many intelligent aliens will develop technology, because technology depends on observing and rationally responding to the tangible, objective world. Any reasonably bright, land-dwelling, tool-wielding species can eventually do that (although in retrospect, it certainly took us long enough). But what is the likelihood of another species' hitting upon and adopting every single one of the abstract economic ideas listed above? Most of the *human* cultures in Earth's past (and even today) would fail such a test.

A hive-like species, or a species that lives in communes, or that is always dominated by tyrants, or which consists of solitary individuals, may be scientifically brilliant and extraordinarily curious, but they will probably never develop the essential concepts of banking and interest and commercial finance that make interstellar travel a profitable, affordable activity.

To such aliens, our "mysterious" banks, our profit-seeking corporations, our compound-interest calculations (so vital to time-dilated star travelers), and certainly our stock exchanges, might be viewed as exotic manifestations of a bewildering alien religion. Even after studying us, they may utterly fail to grasp our motivation (or would they call it obsession?) for transporting cargo between the stars.

Well, I was looking for a "good news, good news" explanation for the Great Silence. I think I've found it.

The economic explanation tells us why, with the whole shining Universe beckoning to them, no alien species has ever been sufficiently motivated to build and launch ships to the stars. They're isolated, not by necessity, but by their own lack of imagination. They're not even sending out messages; nor are they listening for ours.

The Great Silence, therefore, is the silence of poverty. The galaxy is stagnant, with each alien species tragically isolated from the others. Each is a potential supplier of products and information, each is a potential buyer as well, but there is no interstellar intercourse. Not yet.

That's because *we* haven't arrived on the interstellar scene. When we do, we can be the merchant princes of the galaxy. Who cares if the aliens never understand that our traders, engaged in a ten-year (subjective) voyage, are primarily motivated by a century of compound interest piling up at home? As long as we're willing to build and fly the ships—and reap the profits—let the aliens think we're crazy!

We can do for the stay-at-home aliens what was done for us by the great railroad and canal builders, the merchant sea captains, the leaders of caravans. This is not merely the business opportunity of a lifetime, it's the biggest opportunity of *all* time! The Great Silence is our clue that the galaxy needs us—it needs us very much.

There's a lesson in all of this for those who like to dream up exotic, Utopian

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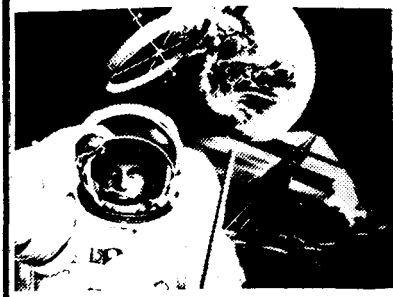
visions of mankind's future.

There are those who long for the day when we shall "progress" beyond the need for private property. They imagine that when we achieve that glorious unpropertied state . . . what? What happens then? They never say precisely what's going to happen. It's supposed to be obvious, and perhaps it is to them, but it certainly isn't obvious to me. Presumably they imagine that when we finally achieve that "lofty" level of existence, we'll automatically start building starships—somehow.

But it doesn't stand up to rational scrutiny. Your savings account and mutual fund shares and insurance policies aren't keeping mankind from the stars. When the Utopian day of socio-economic "liberation" comes, we'll have a society modeled after such "noble" people as the North American Indians—people who, to their everlasting misfortune, had not developed our economic incentives, or even the concept of land ownership—people who therefore (causal linkage implied here) numbered among their greatest accomplishments such technological wonders as . . . the loincloth. (I can hear the knees jerking out there, so let me hasten to add that I'm criticizing an economic system, not a race.)

Those "thinkers" who imagine that we shall become an "advanced" star traveling species when we have developed "beyond" such "primitive" concepts as ownership of private property are dreaming of a future that can never be. You can have a society without property, or you can have the stars. You

The Calendar for the Year 2001



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cannot have both.

So there it is—the likeliest reason why we seem to be alone—we're the only capitalists in the cosmos. And if that's really true, then even though the Universe is seething with intelligent life and probably has been for hundreds of millions or possibly billions of years, we have absolutely nothing to fear. Ladies and Gentlemen of Earth, I bring you tidings of great joy: *The stars belong to us!*

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●I am among those who think well of the human character generally. I consider man as formed for society, and endowed by nature with those dispositions which fit him for society. I believe . . . that his mind is perfectible to a degree of which we cannot yet form any conception. It is impossible for a man who takes a survey of what is already known, not to see what an immensity in every branch of science remains yet to be discovered. . . . I join you therefore in branding as cowardly the idea that the human mind is incapable of further advances.

Thomas Jefferson

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A WORD FROM Brian Thomsen

Time. ***The name of a magazine... Morris Day's backup group... a really bad SF musical...and, of course, the perfect setting for a science fiction novel.***

To use time as a place may seem out of place, at first. But consider Greg Bear's ETERNITY where alternate worlds exist along a cosmic way, and our future descendants return to manage a not-too-future Earth. Or Dean Wesley Smith's "Titantic time trap" where the same few hours are endlessly repeated. For works like these, time is the place—and the setting—for action.

If we could move backwards and forwards in time, I'd move this column to next summer—that's when I get to talk about Greg's next book QUEEN OF ANGELS. But since that only happens in science fiction, we'll all have to wait until next August!

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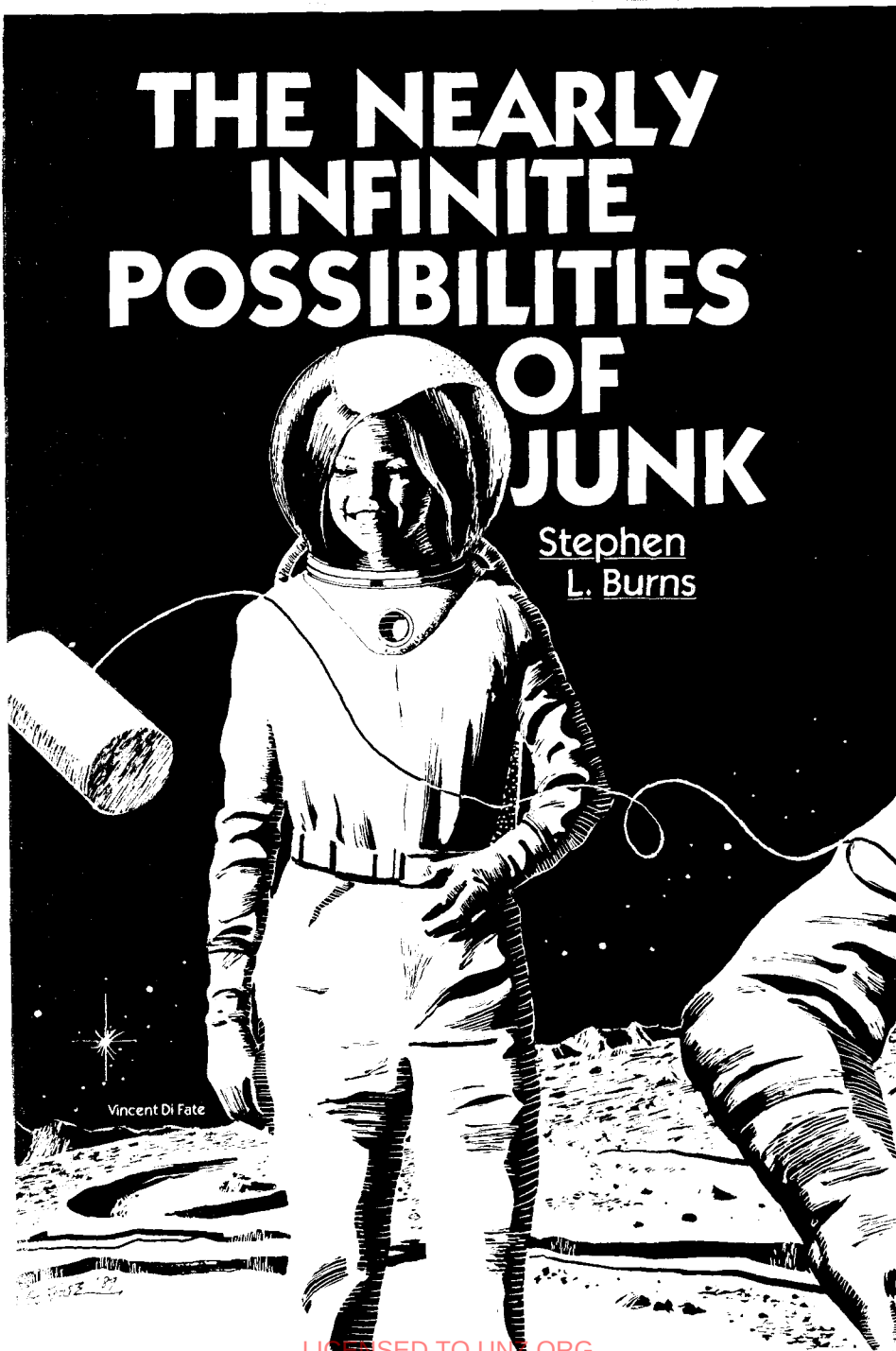
THE NEARLY INFINITE POSSIBILITIES OF JUNK

Stephen L. Burns



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They held the meeting in Vance Hartman's office because of the gravity of the situation.

That office was in a slap-patched old derelict cruiser permanently grounded on the asteroid known as Fred's Ball. The ship's engines had long ago been stripped away. In fact, Vance had pretty well salvaged every unnecessary part of possible utility off the hulk. It was often said that Vance could get five kilos of usable parts out of a busted two-kilo you-name-it, and still have a full kilo of absolutely useless junk left over.

But the ship's spindrum had been left intact, and he had cobbed together a system of gears and drive motors powered by an old, almost played-out WuFusion unit to power it up and keep it cranking.

The resulting spingravved space housed not only his parts and papers-filled office, but also the Fred's Ball Clinic (run by his wife, Shana), the Fred's Ball Community Hall, which was a place for the kids to raise hell and hide from their folks (kids needing both those things to be kids, and gravity besides so they grew up strong enough to take acceleration), and the Fred's Ball Balls-Out Billiard Emporium, which featured Reb Goldfarb's vacuum distilled Algae Whiskey and the only genuine, regulation, leather-pocketed, green-felted pool table with a full complement of balls within 300Kk.

The story of how Vance got that pool table is a perennial favorite. It has been lovingly handled and handed around almost as much as the beautiful real-wood cue sticks.

The story of how Hartman (as in Vance) became a household name is probably as widely known as his name. Part of that story is the tale of how Fred's *Ball* became a name to be reckoned with rather than snickered at. It's a story of lovers and lawyers and labors and lives changed once and for all.

And like so many stories with a happy ending, it had a very unhappy beginning.

The meeting they were holding in Vance's office wasn't like one of the more-or-less monthly Fred's Ball Correct English Council meetings. That's not English as in the language, but *english* like the spin you put on a cue ball. The seven of them didn't so much govern Fred's Ball as try to english it into what the consensus figured was the right pocket.

They weren't holding it over the big green-felt table with drinks in their hands, whacking the issues around as they played interminable games by the idiosyncractic, and occasionally changeable, Fred's Ball Rules.

Nobody was smiling. Nobody was laughing. They were gathered around a scarred old conference table, each one with a big sheaf of official looking papers before him or her. There was a lot of sighing and paper-shuffling, a lot of muttering and fine-print-puzzled head scratching.

Finally old Bernice Berne looked up over the top of her half-glasses at the others sitting around the table.

"This is crap," she announced. "Utter and unrecyclable crap." Her considered pronouncement was a variation on the question she'd levelled at the pale-faced, nondescript and extremely nervous law-

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yer who had grounded on Fred's Ball in an AllMine Corp. light courier and delivered the papers a few short hours before. *What is this crap?* she'd demanded, at the same time giving him a look that could have puckered a plum into a prune faster than you could snap your fingers. Bernice was a teacher, and could fire off that killer look at the drop of a hat or the yank of a pigtail.

The lawyer had mumbled something about it being "legally binding crap," and beat a judicious retreat back to his ship. A meeting was hastily convened. They had spent the last hour or so wading through a quagmire of whereases and heretofores, trying to figure out what sort of crap it was, and just how deep they were in it.

Come to find out it was neck deep and rising.

"Goddamn right it's crap!" Tank Minkowski boomed. "Fred's Ball is *ours!* AllMine can't just waltz in here and steal it from us!" He thumped the table with a knuckly fist nearly the size of most people's heads. Not much taller than he was wide, and all gnarled muscle piled low and hard on thick heavy bones, the Tunnel Chief could have passed for a bearded, blue-eyed kobold.

The restraining hand his wife Clovis put on his arm was dark-skinned and dainty. Small as that hand was, it was iron when it came to her work. Clovis was Life Systems Constable. People swore she knew where every drop of water and molecule of air on Fred's Ball was, and God help you if you wasted even one of either. She kept Tank pretty well in line, too.

"Easy, Tank," she said. "According to this—" She reshuffled the deck of papers before her. "Here it is. This says that a 'routine reexamination' of claim records showed that there was an error in the original application for Fred's Ball. AllMine's lawyers contested our claim rights, and petitioned that it be awarded to them. Since we didn't have a representative on hand to defend our claim and contest *their* contest, all rights to Fred's Ball were awarded to them."

"Ain't the law a beautiful thing?" Reb Goldfarb intoned. "Vance got the fax telling us about this bit of justice in action 'bout an hour before that little bastard from AllMine got here. The claim hearin' was held the day before yesterday. On Earth. We never had a chance." Reb wore the obscurely pleased face of a Registered Pessimist who has seen his world view proved true.

A general mutter went around the table. The gist of it was that they had been shafted, and the parentage, sexual proclivities and disease-free status of the shaftor were in question.

All except for Vance. He just sat there slowly poking something into his compad, apparently not paying much attention to the proceedings. His intent expression made him look like a big old buzzard trying to puzzle out a perma-packed carrion dinner.

"That 'routine reexamination' bit sounds kinda fishy," Shorty Ikoro offered. It was just luck that he'd been on the Ball when all this came up. Usually he was off in one of their two sweepships, sifting their area of the Belt for valuable small debris.

"Fishy?" Reb made a face like he could smell that fish, and it wasn't fresh fish either. "You can bet your yellow

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ass AllMine got their mitts on the latest assays Tiny and me filed."

"Best ore yet," Tiny put in. "We were coming into a lode."

"Shoulda known nothing good would come of it," Reb went on with leaden satisfaction. "We was safe as long as we didn't have nothing worth stealing. But when they saw we did, they jiggered our claim papers and made damn sure we didn't find out about this hearin' until it was too late for us to do anything about it."

Shorty shook his head. "But they're not just stealing our mines, they're evicting us from Fred's Ball, too! What're we supposed to do, live in our suits?"

Clovis turned to another page. "It says here that AllMine has 'generously'—their word, not mine—filed a claim in our name for BXM 573761 AC, a 'roid about 12 Kk from here." She shook her head. "I don't get it. Why give us another rock while they're stealing the Ball?"

Shana Hartman answered that one. "Resettlement Act," she said quietly. "It's supposed to make sure we aren't forced to stay here and work for AllMine or live in their hab-space. Giving us that 'roid greased their claim-jump because it let them show the court we had someplace else to go."

"I been to that rock," Shorty told the others. "That's all it is, a rock. If I remember right, it isn't even a hundred meters across. That isn't big enough to hold us all. Even if it did, there wouldn't be anything left over to mine."

" 'Sides," Reb pointed out, "You know it can't be worth nothing if they're letting us have it."

"They let us have it all right," Bernice grumbled. "Right between the eyes."

"Or up something lower," Tiny growled.

Shana sighed, pushing her glossy black hair out of her dark eyes. "We're in for tough going, that's for sure. Our claim on all Class C debris still stands, but we all know that Shorty's sweeping crew can't take up the slack. We use most of the good stuff, the ices and carbchon, ourselves. There's never much left over to sell. We can probably keep our family's salvage business going one way or another, but that doesn't run much above the break-even point either." She looked around the table. "You all know what they want."

"Goddamn right I do," Reb said in a low, doom-struck voice. "They want us to stay on. That way we'll haveta work for them. They'll have us mining our own ore, pay us as close to nothin' as they can get away with, then turn around and assess us every cent we get and more to live in their habs while we help 'em chew up our own homes! My pa worked for them bastards. I know how they operate. They'll show up in a big autofac, and in a year there won't be nothin left of Fred's Ball. It'll be all et up. Then they'll move on, and we'll have to go with 'em cause we'll be all et up, too."

Tiny heaved himself to his feet. "Screw that!" He balled up the papers before him in one massive fist. "They can take this crap and shove it right up their—"

Tiny bit back his proctological proposition because Sass, the youngest of the Hartman's three daughters, came scampering in right then. The seven-

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year-old made a beeline for her dad's lap. She swarmed up him like a ladder and started whispering into his ear.

The fortunate thing about Vance and Shana's kids was that they took after their mother in the looks department. Vance had the mournful eyes and expression of a big old buzzard. The centerpiece of his face was a hooked, beaky nose that was sort of flattened at the end from being banged up against a p-suit faceplate too many times. Shana was as lovely as her husband was homely, with glossy black hair, dark and sultry gypsy eyes, and a figure that raised the blood pressure of most males and the random female.

Sass whispered something into her father's ear. Vance nodded soberly. Sass giggled. Vance craned his neck to stare at her, giving her a look like her giggling was the most amazing thing he had ever seen or heard in his whole life. The seven-year-old tried to copy his expression, and that broke them both up.

Still chuckling, Vance stood up. He hoisted Sass onto his hip.

Reb frowned up at him. "You leavin', Vance?"

He gave the miner a slow nod. "Got work to do." Those were the first words he'd spoken since they'd gotten the papers which had yanked the rug out from under their world and their lives. Not a particularly talkative man to begin with, this business had turned him into a veritable clam.

"Dad's gotta make us a shelter so's we can watch the 'junction," Sass explained impatiently, clearly surprised that the adults could forget something so important. "Earth an' Mars are gonna 'junct tonight! Dad promised he'd make us kids a shelter so's we can see it with a telerscope!"

"I know the conjunction is important, honey," Bernice explained patiently. After all, she was the one who had taught the children about it, and asked Vance to make a pressure shelter on the surface so they could watch it. "But there's some even more important grown-up stuff that's come up. Your dad has to stay and help."

Vance shook his head. "That's all right. I believe I've heard enough. Talking isn't going to get us out of this jam. But thinking might, so I figure to go talk to the mother, and I might as well get something done while I'm at it." He looked at Shana. "Sass and me'll be in the Yard." He turned on his heel and left without another word.

Shana smiled fondly as she watched her husband and daughter leave, then pulled the compad he'd been diddling with toward her.

"He shouldn't oughta left," Reb said unhappily. "He should be helpin' us do *something* about all this, rather than goin' off to play with his kids and his junk."

"He's going to the mother," Clovis said pointedly.

"Do you think—?" Bernice left the rest unsaid, but they all knew what she meant. *Vance was talking to the mother. Maybe he'd come up with a way out of this bucket.*

Everyone turned to look at Shana when she began laughing.

She pushed the compad to the center of the table so all could see it. "He's already done one thing. That AllMine lawyer asked for an airline to his ship.

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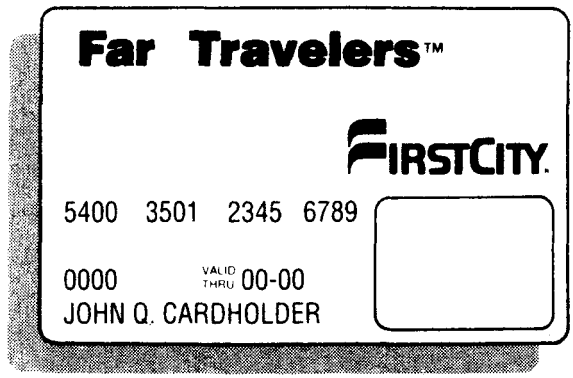
The Shape of Things to Come



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You know the AirLaws, we can't say no. But while we were sitting here talking, he had Mook and Jane run one." She tapped the screen. "Straight from the areobic digester stage of the main 'cycler."

"Holy shit!" Tiny yelped, a delighted grin creasing his broad face. A fresh breeze of laughter blew through the room as they all imagined just how nasty that air had to smell.

Shana nodded, her face glowing with pride in her husband.

"Exactly."

Elmo Luckless knew all about what Vance had done. Not the mechanics, or the specifics, but the result. It was as plain as the big plastic faxclip he'd put on his nose to shut out the stench.

If you had asked Elmo what was in a name, he would have bent your ear with a long, woeful tale of life as a Luckless.

The Eau de Toilette wafting through the light courier ship's single deck seemed to sum his situation up perfectly: he was still in the toilet.

When he'd finally gotten his law degree (after it had been lost in an electronic limbo for over five months) he'd been sure his luck would change for the better. After all, how could it get worse?

But spacers tended to be a superstitious lot, and few were willing to retain a lawyer named Luckless. A name like that sounded like just asking to lose the case. Elmo had ended up practicing out of a converted public rest room in one of the oldest, least respectable tunnels on Pallas, and sleeping in that same four meter by four meter space. Under his desk. Until it was repossessed. Occasional court appointments kept him just this side of eviction, and allowed him to eat about half as much as he needed. That accounted for his lean and hungry look; it wasn't ambition, it was malnutrition.

He would have flamed out years before, but for AllMine. Somehow they always sought him out when he was just about to chuck it all and find honest work. Something his legal practice had qualified him for, like a career as a rest room attendant. AllMine would offer him an insultingly low fee for some dirty, menial job that only a desperate lawyer would take.

Like this one, the third in five years. Spending almost two weeks traveling in DeepSleep to deliver papers evicting some poor bastards from their home. Then having to stay there as their rep until their autofac arrived. In a ship whose scrubbers had gone on the blink three hours out from Pallas. He'd been forced to ask for an airline, and the stuff they sent him wasn't helping matters at all. The air-cycler problem went straight from bad malfunction to outright mutiny.

But the locals would probably get him first. Not that he'd blame them; they were getting an even rawer deal than he was. That was why AllMine had sent him instead of one of their own lawyers. They weren't expendable. He was.

"Well," he said, talking aloud and sounding strange even to himself because of the clip on his nose. "They've had time to figure out those papers. They should be along to lynch me any time now." Long hours spent all by himself in his basement office had put him in the habit of talking to himself.

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There were times he thought that if he didn't, he'd forget how—especially after he'd been forced to hock his cat to keep his rent paid, and no longer had her to talk to.

"Why did you ever take this job?" he asked himself. He shrugged.

"To get my cat and briefcomp out of hock," he answered.

"Ah, and that's worth dying for?" he retorted, taking the adversarial position.

"It's not just that," he replied defensively. "This is the biggest job they've ever given me! You remember what they said! This might be the one that puts me on the ladder!"

He shook his head sadly. "Elmo, you know they were just leading you on. But even if they weren't, do you *really* want to be an asshole full time? AllMine is ripping these people off, and they're ripping you off while you help them. They're paying you peanuts to do their dirty work and to put your life in danger. Once those people understand what's been done to them you're *doomed*."

A thoughtful expression appeared on Elmo's face. "We keep coming back to that part about the Good People of Fred's Ball wanting to come kill me."

There was no way for him to disagree with that. "You're right. I think maybe we ought to go back into DeepSleep for a few days. That way if they do come and kill me—"

He shook his head in affirmation. "—I'll never know it."

If you saw Fred's Ball from a distance, you would notice two things right off the bat. First you'd notice the three deep meteor craters on the roughly spherical asteroid's surface. The same three craters that made Shorty Ikoro, then a boy of nine, exclaim that it looked like Fred Flintstone's bowling ball. Hence the name.

The other eye-catcher was the big silver slug with *HARTMAN SALVAGE & REPAIR —Give Vance A Chance!* emblazoned on its back. It was nearly seventy-five meters long and forty wide, seemingly feeding in a spreading garden of disembowled ships, hab parts, played out mining equipment, and countless wrecked and dismembered devices of every size and description; in short: salvage, scrap and junk in its finest, fullest flower.

Vance and Sass locked out of a pressured tunnel-head inside the slug. Various unmatched landing lights blazed from the high struts that held up the canopy of mirror-bright recycled superfilm. The lights and their myriad reflections cast long, multiplex shadows across a flat floor of foamstone with iron filings mixed in to give their magsoled work boots purchase. The central area was more or less clear to provide an open work space, which meant they only had to detour around movable tool racks, heaps of parts in transition, and several projects in progress. Both sides of the enclosure were home to encroaching drifts and towering, teetering piles of the certainly-useful, the possibly-useful, the we'll-use-it-as-soon-as-we-figure-out-what it is, and-besides,-you-never-know.

Being something of a traditionalist, Vance called the slug the Yard. It was the very heart of his business, his life and his religion.

They clomped toward the Tool Shed,

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a ceramyl-coated superfilm dome at the far end of the Yard. Looking through, Vance found Mook and Jane inside, already waiting for him. They were sprawled on a couple of old acceleration couches with their helmets and gloves off, nursing bulbs of hot coffee.

Mook came lurching to his feet. He was one of Mel and Gina Gnossos's brood. Both Mel and Gina were short, swarthy people; blunt and solid as hammers, miners by trade. But some Genetic Joker in the deck had turned up in Mook. He was a storklike two-and a-quarter-meter blond beanpole, seemingly all overlong arms, legs and neck. Too tall to work in the mines, he had 'prenticed to Vance and turned out to be a pretty fair salvage mechanic.

"Are they really gonna kick us off'n the Ball, Vance?" he asked unbelievingly once his boss had his helmet off.

Vance nodded as he helped Sass push her face-plate back. "Sure looks that way, Mook."

Mook gulped, his trepidation paling his face to a chalky white. "Jeez! What're we gonna do?"

Vance scratched his chin through his beard. "Make that shelter we promised the kids."

That wasn't the answer Mook was expecting, and he said so. "I mean about throwin' us off'n Fred's Ball!"

Vance sighed. "I know what you meant, son. But I don't see anything we can do about that business right this minute." He put his hand on the younger man's shoulder. "You been working for me for going on three years now. What's the first thing I taught you?"

Mook hung his head, looking abashed. "Do what you *can* do first, 'cause if you leave it 'til after doin' what you can't, it'll probably never get done."

That earned him an approving nod. "That's her. And what're you supposed to do when you come up against a real big problem?"

"Call daddy!" Sass put in. Vance patted her head.

"Think about it," Mook said, reciting lessons he had learned the hard way. "Figure all the angles. Try to know what the problem is as 'xactly as you can, and scope out all the possible fixes before you start, 'cause you get more done with your head than a hammer."

"See? You know what to do. Now I'll admit that this is one two-ton, cast iron, rusty-nutted ball buster of a problem. There might not even be a way to fix it right. But I know only one way to go about trying."

Mook grinned sheepishly. "I gotcha, boss. You're saying we oughta stop flapping our jaws, start flexing our brains, and get to building that shelter."

Jane took that as her cue to stand up, crushing her empty coffee bulb. "Well, I hope you two clowns are done dickin' around playing geek and guru. We might get some real work done around this dump."

There are a few things you should know about Jane.

At twenty-two, she was Vance and Shana's eldest. God had been kind in not making her look like her father; she favored her mother in face and form. The truth of the matter was, she was so teeth-gnashingly beautiful that she could turn most young bucks' brains to quivering jelly with just a smile and a wink. But she preferred to take them apart a

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piece at a time, like cheap machinery. Her sharp tongue was her weapon, her scathing contempt and her extensive vocabulary of expletives were its honed edges. She was, in short, a holy terror.

Part of that came from growing up in a junkyard. It had left her more than a little rough around the edges. Fact was, she'd take your fingers off if you tried to pick her up.

But she was rarely so nasty with her father. Not only did she adore him, she was very much a chip off the old block. She had that same nearly supernatural mechanical knack, that same methodical pragmatism. Most of all, she shared that same rock-bottom, quasi-religious belief that given enough junk, anything was possible. Their similarity of mind let her read her father like a repair manual.

Jane knew that her father was scared, and scared bad. That scared her, and she didn't like it very much.

You see, Universal Rule #1 is: *Things break.*

Jane could tell you that when you're ten million kilometers from the factory and your air scrubber breaks down, your warranty and their stock of parts aren't worth a plate of piss at dinnertime. You need someone who can fix it with what's at hand, and fix it *now.*

That was her dad. He was a master fixer. It didn't matter if it was mining equipment, ships, cyclers, tugs, toasters or toys; 999 times out of 1,000 he could patch it up and get it working again.

Not only would he fix things, he could also build things. Out of junk, of course. The flightless ship that housed the clinic and pool hall was a good case in point. Fred's Ball was a loosely (at best) organized cooperative. Working together and pooling their resources they got by—but only by the skin of their fiscal teeth. One thing that had drained their meager resources was the high cost of free-fall anti-adaptation drugs.

The obvious long-range solution was a centrifuge. But buying one would have bankrupted them. Vance got hold of the decommissioned hulk through a complicated five-sided trade, cobbled together a cheap, reliable, non-propellant driver for the spindrum, and provided them with one several times the size of anything they could have afforded for a fraction of the price. To top it all off, he managed to strip off and sell enough parts to break even.

In space machinery is all that stands between life and death. Because Vance could bend machinery to his will, the people of Fred's Ball had come to regard him as their own personal wizard. When things went wrong, they just naturally looked to him for the solution.

Things had gone about as wrong as they could.

Jane didn't have to go take a survey to know that, like Mook, a lot of people believed that Vance would figure out a way to bail them out. Some even expected it.

Deep down inside, Jane believed it, too.

That didn't help sweeten her mood one bit.

The four of them helmeted up and went back out into the Yard. Mook and Sass brought up the rear, Sass telling him some labyrinthine joke that kept wandering further and further away

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from the punchline. She adored Mook as only a girl her age could adore an older boy. He bore it good naturedly.

Jane knew that her father did his best thinking in the Yard. She did. That was because both of them were junkers through and through. Most people are unmoved by junk; they can't see past the rusted, dented surface. For them junk is a pejorative term.

But someone with salvage singing in their blood sees something completely different. Both Jane and Vance saw the heaps and piles and racks and drifts of pieces and parts and electrical/ mechanical/cybernetic/optic/hydraulic orts and bits as a world of nearly infinite possibilities. That is the reason junkers are always buying and trading; they have this unshakable conviction that if they can just get their hands on just the *right* busted whatchamacallits, they'll finally break over the threshold into the realm of truly infinite possibility.

Salvage was Vance's religion. The mother was his muse and guiding spirit. Jane kept the faith.

They had already salvaged a size two Omnilok out of an old rockhopper. That would match up with Nort's Lock, out on the surface a couple hundred meters from the Yard. Nort's Lock was named after the man who got turned around while tunneling drunk and punched the surface hole. They say he dug a good three meters straight up into nothing before he noticed he'd run out of rock.

The problem was Nort's Lock was nothing but a windowless steel box —hardly the best vantage point for 'junction watching. The plan was to build a ceramyl-sided shelter with a clear perspyl top there in the Yard, haul it out to Nort's Lock, mate it up and foamstone it down. That would give the kids a safe, reasonably large place where they could camp out and mess around while pretending to further their educations.

Jane got out a small bolt of the same silvery superfilm that covered the Yard. Vance had acres of the stuff. Some of it was cast off solar sail from slowhaulers. Some came from old solar reflectors. The stuff had a thousand uses. It could be given a magnetic charge to repel space dust and some radiation; it could carry electric current; it was heatproof, ultralight, and tough as hell, even though it was no more than a few molecules thick. The stuff had a thousand uses.

They rolled it out and began using a special cutter to lay out the shape they wanted. Since Sass proved to be less help than she thought she was, Vance had Mook keep her occupied while he and Jane welded the cut seams together.

Father and daughter worked together with scarcely a word exchanged. The shelter quickly took shape under their four deft hands. Jane kept her usual banter bottled up, giving Vance space to think. Before long they were ready to attach the flaccid silver bag to the lock.

Sass got bored and began cajoling Mook to make her a balloon from the scraps of superfilm.

"I can't make a ball, hon," Mook admitted. It took a special knack to cut a flat sheet so it would shape into a sphere. Jane had that knack, he didn't. "But we can make something else."

Vance charged the steel lock and the shelter's superfilm skin so they would repel each other. The silvery material

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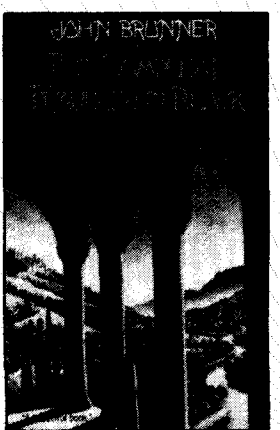

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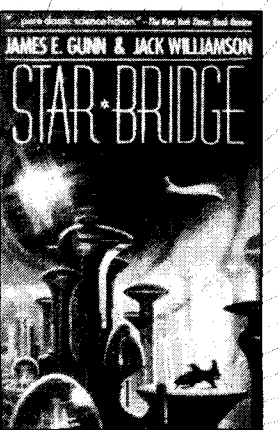

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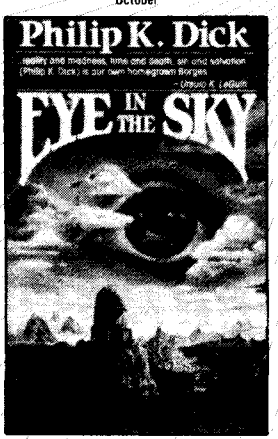

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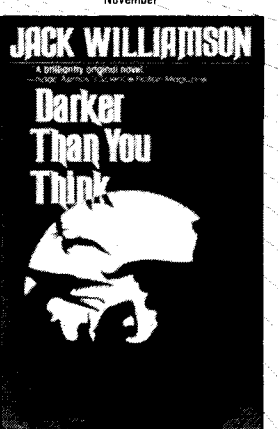

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snapped taut into an eight-meter wide hemisphere, two meters high at the center, the lock flattening one side.

Mook finished cutting the scraps into the shapes he wanted, then began bonding them together with a hand-sized superfilm welder. Sass watched raptly, beginning another of her drunkard's walk jokes involving a penguin, a rocket, and a bear named Ralph.

"That's got her," Vance said, approving the dome's shape. "You ready to coat her?"

"Betcher ass, paps." Jane had a small 'muter slung over her shoulder like a weapon. She looked ready to take on the world.

The 'muter was a multi-use tool that 'transmuted' (though that was nowhere near the proper description of the process; it was simply a fusion-cracking, charge-sorting and binding process) finely powdered rock or tailings into a superhot spray of one of the neoceramics; opaque ceramyl, translucent chinyl or glass-clear perspyl. It could also produce the various grades of foamstone, though not as efficiently as the lower-temperature, high-volume versions designed to make only foamstone.

"Have at her then." Jane nodded curtly, then began laying a thin coat of ceramyl over the lower portion of the dome. The still-liquid ceramyl left the 'muter's nozzle charged so it would be attracted to the superfilm, and hot enough to make steel run like wax. But the thin superconducting film carried the heat away so efficiently that it could stand up to such intense temperatures. The five-millimeter layer of ceramyl she was laying down would be harder and stronger than five *centimeters* of high-grade plate steel.

Vance half-watched his daughter work, communing with the mother. His head was full of their troubles, but as yet empty of answers to them. Mook had finshed building Sass' toy, a small, drum-shaped superfilm balloon. He filled it with gas to inflate it, then attached a long elastic cord. He bounced it out to the end of its tether. When it rebounded he thwacked it again.

"That's real spiffy!" Sass exclaimed, bouncing up and down in excitement. "Lemme try it!"

Mook gave her the end of the cord. She let out a whoop and punched it a few times before yelling, "Hey Janey! Look at what I got!" and punching it in Jane's direction.

"I'm busy, squirt," Janey grumbled, concentrating on making sure there were no thin spots in the ceramyl coating. "Show me later."

"Now!" Sass shrilled, punching it toward her older sister as hard as she could. The tether slithered out of her gloved hand.

The silvery toy passed in front of Jane's faceplate. She cursed unprintably, pulled up and blasted it with the 'muter. The toy was spinning fast enough to receive a thin, even coating of ceramyl. Now sheathed in ultra-hard ceramyl, it continued on up to hit the superfilm canopy over them, rebound, and come flying back down to catch Vance square in the chest.

He had been oblivious to the horseplay and never saw it coming. It hit with enough force to stagger him back, and he grabbed hold of it out of reflex.

"Oh shit," Mook and Jane whispered

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simultaneously. Sass' eyes grew huge and fearful. They all knew they were in for it now.

But Vance just stood there staring at Sass' ceramyl-coated toy. The seconds ticked by, and each one that passed made the three young people more afraid of the blowup they knew was building.

Vance turned the drum over in his gloved hands, then let it drift free, and with a delicate, almost reverent touch set it spinning. It hung in the nothingness before him, slowly revolving.

"*Sweet mother of Fred*," he whispered in a low, awestruck voice. He turned toward Jane, Mook, and Sass, who drew together for protection.

"Kids . . ." He shook himself as if trying to wake up, then started toward them. But instead of yelling at them, he began to laugh. They stared at him, the faces behind their faceplates variously fearful and uniformly dumbfounded. Then Jane, being the bravest, stepped forward to meet him head on.

Vance threw one arm around her, held out his other arm for the other two, growling, "Get over here you little bastards." Mook and Sass exchanged frightened glances, then went to meet their fate hand in hand.

He swept them up and hugged the stuffings out of them. "The mother was kind," he told them, still half-laughing as he talked. "I've got . . . I mean, I've figured—" He took a deep breath and shook his head. "Your messing around may have saved out butts, kids! Here's what I want you to do: Mook, I want you and Sassy here to go back to the Tool Shed. Start comming everybody. Tell them to tune into the Freddivision channel. Tell 'em there'll be an important announcement fairly soon. Jane, I want you to scare up a compad and come with me."

They just stared at him, still confused by their commuted sentence and this sudden manic turn.

"Come on, hustle!" He laughed again, whacking each in turn on the seat of their p-suits. "We've got one helluva lot of work to do!"

Vance blew back into his office like a whirlwind, Jane hard on his heels. Judging by the variety of glum expressisons on the faces around the table, they had gotten exactly nowhere in his absence. Their surprise changed to confusion when they saw that he was grinning from ear to ear.

"We were about to vote on whether or not to space that lawyer AllMine sent," Clovis told him. "You that glad you didn't miss it?"

"Never mind that," he said. "Questions: We have sixty days until that autofac gets here, right?"

Clovis frowned. "That's right, but—"

"What about mining? Do we have to stop right now? Are the tailings ours to keep?"

Reb answered that one. "We can mine all we want. We just can't sell what we mine to anyone other'n AllMine. I guess the tailin's are ours to keep, seeing as they're worthless."

Vance's grin threatened to split his face in half. "Better and better." He turned toward Shorty. "How many functioning workpods we got? How many heavy tugs?"

Shorty thought for a second. "Ten

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pods working. Both tugs are still holding together since you fixed them last."

"Great! Get them over to my Yard as fast as you can. Tank, I want you to bring me every 'muter you can lay hands on." He faced Reb again. "Rock and tailings, crushed to use in the 'muters. We're gonna need a shitload, probably all you have and more. You and Shorty work out the haulage. We'll need it all about ten klicks off the Ball. But you'll have to handle it with a bare-bones crew. Anybody you've got who knows one end of a tool from the other, send them to me. Then I'll want—"

Tank lumbered to his feet, his face set in a stubborn look and his big hands flat on the table. "Now slow down one goddamn minute, Vance! I think you oughta stop passin' out orders long enough to tell us what the hell's going on!" Reb nodded in agreement. But Clovis, Bernice, Shorty, and Shana wore hopeful looks, each wondering if maybe the mother had come through.

"Watch your ass, Tank," Jane warned darkly, starting toward him. "Dad's trying to pull your nuts out of the fire, so don't—"

"That's OK, Jane." Vance put his arm around her, partly to calm her, partly to keep her from attacking Tiny. "They must think I've gone off the deep end."

He paused a moment to get a rein on his excitement and put his racing thoughts in order, glancing down at his wife. She gave him an encouraging wink.

His grin reappeared, though this time it was a bit on the sheepish side. "Sorry, folks, I just got carried away. Here's what I'm thinking, and here's what I've got in mind. AllMine's going to take the Ball, there isn't any way for us to stop them. So what we're going to do is build us a new place to live. It's going to be something like one of the big cylties. Not as big as one of them, but big enough for all of us. We're going to build it out of rock, tailings, and junk from my Yard, and if we really bust our asses, we can be moved in and thumbing our noses at AllMine when they get here."

Tank sat down. Rather abruptly, and with his mouth hanging open. Clovis patted his hand and watched Vance expectantly.

Reb squinted up at him. "Vance, you gone vachappy? Cylinder habs are expensive as hell, and take *years* to build! Besides that, we don't have anywhere near the metal we'd need for just the skin, to say nothin' about the whole mess of other stuff we'd need to build one! What're we gonna use? Stone girders?"

Vance showed them the face of a man who has not only seen the naked face of his god, but managed to beat him at poker. "Not stone girders, but stone. It's going to be *big*. Big enough for all of us and our kids to come. It's going to have spingrav, and sunports, and . . ." He spread his hands, unable to express the breadth of his vision.

He shook his head and let his hands drop. "There's a lot to tell and no time to spare. I've already sent the word around to have everybody tune in to Freddivision. They already know about the eviction, and the sooner we tell them we've got a plan the less scared and riled they're going to be. My idea will *work*, but we can't afford the time it would take me to tell all of you first,

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talk it to death like we usually do, and then tell everybody else so we can vote on it. I want to lay it out for you and everybody else all at once. We can have a vote out of the way and start working within the hour."

He drew himself up and met the eyes of each in turn. "I've got everything we need but time to waste. Will you trust me enough to skip running this through the council first?"

Shana stood up and put her arm around her husband. She didn't say a word. She didn't need to. Her serene, certain smile said it all.

Nobody else moved. They all knew that there was a subtler issue at stake. Vance was asking to run things, even though he hadn't come right out and said so. It wasn't that they didn't trust him, and the vote would ensure that the consensus still ruled. But having one person running things was a precedent they were uncomfortable with setting.

"What kind of bullshit is this?" Jane demanded. "My dad has never let you sonsofabitches down before! Anybody says he has, I'll tear off their heads and spit down their neck-pipes!"

Shorty stood up. "That's good enough for me!" He bowed in Jane's direction. She bared her teeth at him.

Bernice joined him, looking nervous but determined. "I sure hope the mother has her head on straight," she told Vance.

Tank and Clovis exchanged glances. She stood up. He stared up at her, muttered something unintelligible under his breath at what he read on her face, then stood up wearing a pained expression. "Why the hell not?" he growled. "It ain't worth getting cut off for."

That left Reb. The skinny older man drummed his fingers on the tabletop, glowering up at the others. "I think you got rocks in your head, Vance," he said heavily. He reached inside his coverall, pulling out a small silver flask. After slowly and deliberately uncapping it, he tipped his head back and took a long swallow.

He sighed and smacked his lips, then stood up. "I guess it don't matter 'cause we're doomed anyway." While not exactly a vote of confidence, that made it unanimous.

"I wouldn't be so sure, old buddy," Vance told him. "Want to do this in the pool room? Janey can run the camera."

She grinned. "Should be fun. It looks like I got me enough monkeys to put on a pretty good show."

Elmo Luckless clunked his head getting out of the DeepSleep tank five days after he'd entered it. He'd forgotten he was in practically zero gee, and was not a morning person in the bargain.

Rubbing at the rising knot on his forehead, he shuffled to the galley to draw a cup of coffee from the dispenser. Blearily looking around while waiting for it to cycle through, he saw that the ship's main control screen was flashing for his attention.

"Now what?" Coffee in hand, he sat down and queried the shipcomp. The screen rapidly filled with bad news.

"Oh what a beautiful morning," he muttered. The ship's air system problems had gotten worse. He was warned that it could keep up with the demand that his being out of the tank put on the system for no more than four hours. It advised him to use his outside airline,

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and contact a factory authorized repairperson as soon as possible.

"Right," he told the machine. "They're sending me sewer gas instead of air as it is. If I show my face out there they'll probably fix it so I don't need air ever again." He cleared the screen and slumped back, sipping his coffee and meditating on the concept of a life support system that seemed to want him dead.

It was a pleasant surprise to wake up alive; he'd climbed into the tank half-expecting to wake up dead. Maybe the good people of Fred's Ball weren't a particularly vengeful lot.

But then again, he told himself, maybe they were just waiting for him to awaken. After all, how much fun would it be to space somebody who is already out colder than a mackerel?

"Wait a minute," he said, sitting bolt upright and frowning. "I *am* awake!"

Seconds later he had called up an outside view to see if there was a lynch-mob creeping up on him at that very moment. But the rocky expanse outside his ship was as barren as his love life. He called up a wider view just to be on the safe side.

"What the hell?" There was some sort of intense activity directly above him, some ten kilometers up. "Mag the view," he told the comp. Maybe they were getting ready to drop a giant rock on him. Could you do that without gravity? he wondered.

Now he could see what they were doing, but that didn't mean he had the slightest idea of what they were up to. He instructed the shipcomp to let him listen in on the highest priority comm-channel they were using. There was a momentary babble of voices and wash of static.

"*—kay, Shorty, back her in.*" On the screen the retros on one of the two tugs up there flared. It backed up tight to a bulky package strapped to the back of the other tug.

"*Whoa!*" that same voice called. "*Stand by. Mook, Jane, you ready?*" Two assents, one male, the other female and obscene enough to make Elmo blush. The three bulbous, bumblebee-shaped workpods moved in, began attaching lines from the package to the other tug. Once the lines were in place the pods backed out of the way.

"*OK, 'Dira, you hold station. Start easing her off, Shorty. Take her slow and careful.*"

"*Like porcupine sex,*" the tug driver assured him. The tug's drives pulsed.

Elmo watched, fascinated, as one tug began to creep away from the other. The bundle pulled apart and began to spill what looked like liquid silver into the widening gap. The distance between the two tugs grew steadily. He kept one eye on the scale at the bottom of the screen. Soon the two tugs were about 400 meters apart. Between them hung a thick knurled silver column.

"*Hold her there,*" called the man who seemed to be in command of whatever the hell it was they were doing. "*Mook, you ready?*"

"*Ready, boss.*" One pod bumbled back in. There were big tanks mounted on its back. A long flexible hose ran from the tanks to the end of one of the pod's waldos. The pod operator jockeyed the hose-end into a nipple near the point where the silver column was at-

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tached to one tug. *"Got her in,"* he called once the attachment was made.

"He did that pretty handy, Vance," the one called Shorty said. *"I hope you're watching him close around your daughter!"*

"It isn't the times I'm watching that worry me," Vance answered. *"Let her rip, Mook."*

"'Sides," the woman—his daughter?—put in, *"It ain't how fast you plug it in, but how big it is and long you leave it there that counts. I hear the name Shorty fits you every which way!"*

Elmo pulled his briefcomp toward him, queried the name Vance. All known records about the inhabitants of Fred's Ball had been loaded in before he left Pallas. The screen quickly filled. He only read *HARTMAN, VANCE OSCAR: SALVAGE OPERATOR/ SETTLEMENT COUNCIL MEMBER* before his attention was drawn back to the shipcomp screen.

"I'm, uh, starting, Vance," the one called Mook stammered. Elmo figured he must have begun letting some sort of gas in though the nipple. A bulge appeared and began rippling down the wattled silver neck.

Elmo watched, fascinated, as the wrinkled silver column swelled and unfurled. The ranger read out the change in its diameter at the bottom of the screen: ten meters . . . thirty meters . . . sixty meters . . .

"That's old solar sail!" he exclaimed. This was no incredible holmesian deduction; as the whateveritwas swelled, seams and patches appeared. One 20m × 20m patch bore part of the TranSolar Lines logo.

Before long the thing dwarfed the pods and tugs. A quick scan through showed him that comm chatter had turned to an expectant silence. The silver skin grew tauter, forced ever outward by the expanding gas. He could see that it would very soon take a definite shape, but still didn't know what it would be.

Elmo sat there in silence, watching and thinking. The minutes piled up into hours around him, and he was shocked out of his contemplation only when an ear-splitting warning buzzer went off, telling him that he was running low on air. Shocked meaning he leapt straight up out of his chair and thumped his melon on the padded overhead.

"I'm going to sue somebody about this damn ship," he muttered darkly, once he got back into his chair and his heart quit stuttering. The readout said that he could come out again after four days for another four hours, and in truth he did feel a little short of breath—though that might just have been from his near heart attack. Above the flashing red print the thing the Fred's Ballers were making had a definite shape now. It was a drum roughly four hundred meters long and five hundred meters in diameter. It hung there between two tugs, making them look toy-sized in comparison, light gleaming off its curved silver sides.

The warning shrieked again. He slapped the defeat in irritation and headed toward the tank.

But he couldn't help looking over his shoulder at the enigmatic silver artifact as he keyed in the tank's instructions. "They're up to something," he told himself portentiously. "Something big.

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I should comm AllMine and let them know."

"That's right," he parried sarcastically in his adversarial voice. "You better help poor, pitiful AllMine protect their interests. You've already helped them steal this place from its owners—who, I might add, haven't given you the spacing you probably deserve. Now we wouldn't want to risk their somehow getting out of the bucket we've helped put them in, would we?"

"But I'm AllMine's lawyer! It's my duty to help protect their interests!"

"*You're a putz!*" he shot back. "You're their *patsy!* Their lawyers come from good schools, know the right people. Their offices aren't in a toilet—they probably don't even use such things! I bet the most janitor among them spends more a week on lunches than they're paying you for this whole job! Face it, you're nothing more than a delivery boy. A sacrificial goat."

He took exception to that. "I am not! Besides, if I do this well enough, then maybe they'll take me on. How about that?"

"You've got a better chance of becoming a Supreme Court Justice, and you know it. But OK, suppose you do comm AllMine. What are you going to tell them? That a junkman and a bunch of miners are making a big silver soup can? So what? They'll laugh in your face, which would at least be a nice change from having them laugh behind your back."

Elmo had to admit he had a good point there.

"I'll tell you what," he told himself at last. "We'll wait until after this sleep. Four days should give us a better idea of what they're up to. How's that sound?"

He shrugged. "Not bad, considering whose idea it is." The matter decided, he climbed into the tank and pulled the lid shut over him. The sleeptank board flashed, and began a slow, metronomic chirping as it put him under. There was a digital readout on the board. Over it were the words SLEEP DURATION.

The number, keyed in while he was paying more attention to his dialogue than to what he was doing, read: *40 DAYS*

The deadline was now two weeks away, and they had decided to hold a meeting of the Correct English Council to make sure everything was coming together on schedule. High above them work on the artifact, now referred to as Big Mother, continued on unabated. It had been going on around the clock from the moment the inhabitants of Fred's Ball had voted to make Vance's inspiration a reality.

Shana had even persuaded the man himself to take a couple of hours off and come to the meeting. He needed the break, and after all, the only set of complete plans was stored between his ears.

Most of the details had been hashed out, and the meeting was sort of winding down. Everyone was in a pretty good mood until Reb pulled off a tricky two-bank combination, leaned on his cue, and made the sort of face you'd expect from the game's loser.

"Got something in my mind," he said to no one in particular.

"Hope it doesn't squash the poor little thing," Bernice shot back crossly. She had lost the game and a 5Cr bet.

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Reb shook his head, looking even gloomier than usual.

"Well, out with it," Clovis told him, getting up to freshen her drink. "Ruin our evening."

"Well," he began, "I gotta say that Big Mother is the most 'mazing thing I've ever seen. When old Vance here told us he'd figured out how to build us a place big enough for ever'body I was sure he had a case of the brain-glitchies. Then when I saw what he had in mind I didn't figure it was possible, 'cause if it was, somebody would've already done it. OK, I was wrong. Big Mother is coming along pretty good—"

"*Pretty good?*" Shorty demanded. "That's like saying space is bigger than a breadbox! It's a goddamn *miracle!*"

Reb held up his callused hands. "I ain't gonna argue that, it's not what I'm getting at. I mean we're making us a place to live, no two ways about that. It'll probably end up being an even better place than the old Ball, here. But what're we going to do when it's done?"

"Move into it, for Chrissakes!" Shorty snapped. "What the hell did you think we were going to do? Get two gerbils, turn 'em loose in it, and let 'em use it for a giant treadwheel?"

Clovis spoke up. "I think he means what are we going to do for a living? We won't be able to mine the Ball unless we do it for AllMine, and we sure as hell can't mine the Mother."

"That's it," Reb said mournfully. "We can't. But mining is how most've us make our living. Fact is, it's all we know."

"How about that rock we supposedly own?" Bernice asked. She topped off Reb's glass to show there were no hard feelings.

Tank leaned on the table, shaking his head. "Couple days ago 'Dira Kohleri and me cruised out there, ran some tests. It's a helluva lot smaller than we thought. Bein' so small, we were able to scan it pretty thoroughly. No ice. No carbchon. There might be enough trace metals in it to fill our kids' teeth, but that's about all."

"Sweeping can't take up the slack," Shorty admitted. "We were using both sweepships full time before this started."

"See what I mean?" Reb said. "We're gonna have to figure out something, or we're gonna end up in AllMine's pocket after all. Nobody's got any ideas?"

They all turned to look at Vance. He and Shana were sitting quietly off to one side, holding hands and just enjoying the chance to be together. They hadn't seen much of each other lately. Besides treating the usual work-related accident victims, she and Clovis had been running around like madwomen, packing up everyone's households for them. That freed up the maximum number of hands for the work on Big Mother.

As for Vance, he had bitten off almost more than he could chew. He had been going at it hammer and tongs twenty hours a day since the very beginning, and sleeping either in the Tool Shed or in the construction shack up on Big Mother so he could be available at a moment's notice.

Coming up with his grand conception and seeing it realized had filled him with a creator's splendid energy. But sitting down and out of the center of the vortex for a short while, his friends could see the toll it was taking. His face was hag-

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gard and drawn. Even his beard seemed to droop tiredly. His eyes were smudged with fatigue. Lost weight gave him the look of a man who hadn't had a square meal in weeks.

He saw them looking at him and shook his head. "Sorry, folks, I'm hanging on to this project by my fingertips as it is." He sighed. "But as long as we're worriting, there's something else Shana and me've been wondering about."

"What's that, Vance?" Bernice asked. "You worried you'll run out of junk before the Mother is done?" Her attempt at a joke fell flat on it's face. No one so much as smiled.

"Vance and I have been wondering about that lawyer who delivered the eviction papers," Shana said, letting her husband lapse back into silence. "He's still here, even though we haven't seen hide nor hair of him since. I've had the kids monitoring the comm and keeping watch on his ship. They haven't seen or heard anything, but that doesn't mean he isn't telling everything we do to AllMine."

She let that sink in for a moment before going on. "If he's actively working against us, we ought to find out now. That way we'll have a chance to at least try to do something about it before it's too late."

"Clean forgot about him, we been so busy," Tank rumbled. "We should've spaced the bastard right then and there."

"Still could," Reb pointed out. "It ain't like we've run short on vacuum."

Bernice shook her head, wearing the sort of prim, disapproving look any teacher worth her salt has down cold. "We can't space somebody just because he works for AllMine! He's a fellow human being, after all!"

"No, he's a lawyer," Reb shot back. He crossed his arms and shook his head. "Ain't the same thing at all."

"It's pretty clear we ought to at least talk to him," Shana said reasonably. "We're within our rights building the Mother, but rights don't mean much to AllMine. Their stealing the Ball proves that. Maybe that lawyer's got some nasty surprise up his sleeve. Maybe not. We ought to find out. You sound least likely to throttle him on the spot, Bernice. You want to volunteer to go talk to him?"

She shrugged. "Why not? I still have to work on the kids' schedules tonight. Is tomorrow soon enough?" Bernice had organized the children into teams that ran errands, fetched food, water and tools, and did the countless other odd jobs that would have taken an adult otherwise. She was also supervising care for all the littlies, age six and under, further freeing the adults to devote all their energy and attention to the work on Big Mother.

"Ought to be." Shana eyed her husband, then the others. "It's getting pretty grim in here. I move we adjourn and have a fresh round of drinks." She let loose with one of her stunning, contagious smiles. "We're going to make it, folks! When AllMine gets here expecting us to have to live with and work for them, we're going to tell them to kiss our asses! Sure, we got some things to work out, but haven't we always?"

Vance grinned wearily and put his arm around her. "See? She's got the beauty *and* the brains in the family. I second her motion."

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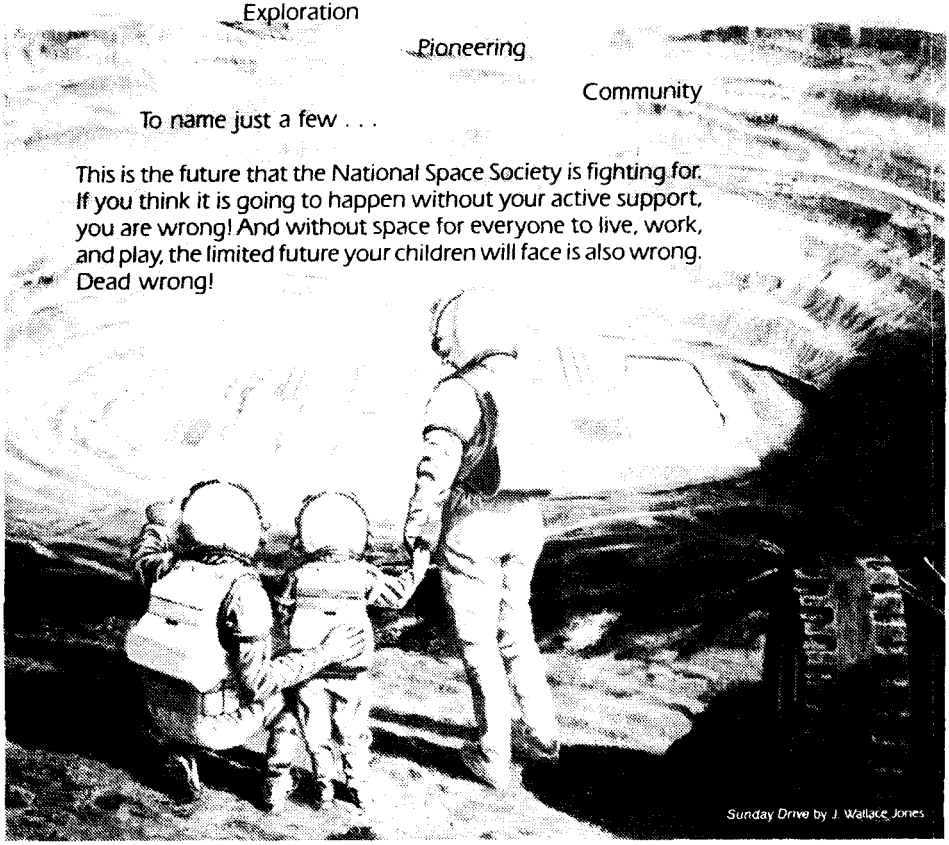

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"Sign me up, I third, and so moved!" Reb declared, thumping his glass down. He uncorked a fresh bottle of his algae whiskey and began to pour all around. "'Sides, if there's one thing I hate worse'n lawyers, that's empty glasses!"

Bernice did visit the ship to pay a call on AllMine's lawyer that next morning.

But there was no one home when she got there.

Elmo watched the pod pass by him and ground under the Yard's silver canopy. He swallowed hard and prepared to put his plan in action.

When he had come out of the DeepSleep tank and found that he had accidentally put himself away for not four, but *forty* days, it was time for a fear-fueled, full-blown panic. A check on the mysterious project the people of Fred's Ball had undertaken had transmuted that panic into acute and absolute hysteria.

He had berated himself loudly, and at length. He was a lousy lawyer. A loser. He was incompetent, inept, and the name Luckless fit him better than his skin. His practice—his life—was an exercise in absurd, fumbling futility.

He couldn't even do the simple job of hanging around and keeping an eye on things for AllMine without utterly and unretrievably messing it up. He knew they would be very interested in what the evictees had done, and they wouldn't be very understanding when he tried to explain why he hadn't told them about it. The way things stood, it was an airtight certainty that when they were done with him the closest he would ever come to a Court of Law was working a shoeshine stand outside of one.

It was somewhere around the time that the air was running out again and he climbed into his p-suit (distractedly wondering why he hadn't thought of that before) that he finally got to the point of wondering what, if anything, he could do.

During a long, acrimonious dialogue with himself, his adversarial self (always the coolest head of the two) had pointed out that there might be one way to save something from this whole misbegotten misadventure. But it was risky, and required him to do some slightly unlawyerly things. Desperation served to overrule his objections to the plan.

Four hours of research later, he was on his way out of his ship. Scuttling from shadow to shadow like a timid spy or assassin, and feeling as exposed as a man swimming naked with sharks, he had made his way to Hartman's salvage yard. He found himself a place to hide inside a gutted crawler and began waiting for Vance Hartman.

Zero hour had arrived. He loped in after the pod, his heart a furious gavel in his chest. No one else was around, and he hoped he could get his business with Hartman over before anyone else showed up. He didn't doubt for one minute that if the good people of Fred's Ball found him, he'd end up sucking vacuum before he had a chance to even try to explain himself.

He watched a work-suited figure emerge from the pod and clomp toward the small pressured dome at the end of the Yard. That suited him just fine. Privacy would increase his chance of suc-

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cess. He followed after, reaching the lock as it went green once more.

This was it. He took a deep breath. A slap of the lock button and he was committed. Wondering if he should be committed.

Once inside he saw no sign of Hartman. He undogged his helmet and flipped it back. After a moment to compose himself for what he had to do, he called out. "Mr. Hartman? Are you here?"

A head popped up at the other side of a pile of crates. But that head had short, glossy black hair and beautiful gypsy eyes. Those eyes narrowed suspiciously.

"Who the i'facing hell are you?" Jane demanded, coming out from behind the crates carrying some sort of floppy rubber widget in one gloved hand.

"Elmo Luckless," he replied, trying to force a confident smile, but ending up wearing the sort of expression you'd see on a man having suit-catheter problems.

Her frown changed into a dazzling smile that did little to help him keep his thoughts in order. "You're the lawyer," she purred, coming closer and somehow managing to move in such a way that he knew, deep down in every brain cell and slosh of rising hormones, that the body under that bulky, sexless suit was a perfect match for that lovely, lovely face.

"That's, uhh, right," he stammered. "I, ah, came here to see Mr. Hartman about—"

"My dad."

"Huh?" Her lips were exactly flawless. He couldn't help noticing.

"Vance Hartman is my father," she explained. She undulated closer and looked him up and down, one ruby lip caught between her sharp white teeth. "You know, you're a pretty good looking man. Handsome, even. And if you're a lawyer, you must be pretty smart."

Elmo's felt himself blushing. His control of the situation was not only nil, but running into the negative at a speed that could have revolutionized space travel. He gulped and ducked his head shyly. "Well thanks, but—"

The rest of his demurral went unspoken because at that moment Jane stepped in, brought the rubber widget around in a short, but highly efficient arc, and coldcocked him. He hit the foamstone floor hard enough to bounce.

"But you're dumber'n whaleshit if you think I'm going to let you get at Dad." Jane told the insensible lawyer, still smiling.

She turned him over with her booted foot so she could see his face. "I ought to space you right here and now," she informed him, not that he was paying any attention. She stared down at his face, her smile subtly altering.

"But you sure as shit are pretty. . . ."

Elmo came to with a fist-sized knot on the top of his head, a splitting headache, and absolutely no idea where he was. His lack of data on his whereabouts passed faster than the pain in his head. It was obvious once his eyes uncrossed.

He was in a toilet. There was gravity, which meant he was probably in the grounded hulk where he'd first come to deliver the eviction papers. He made himself stand up, clutching his head to

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keep it from falling off, and tottered to the door. It was locked. Somehow he wasn't surprised.

"This is great," he muttered, looking around. His eye fell on a pink plastic box perched atop one of the sinks. He opened it up, finding it full of emergency rations. There was a note atop the foil-sealed bars.

YOU WERE JUST TOO PRETTY TO SPACE, the note said, SO I FIGURED I'D JUST PUT YOU OUT OF THE WAY FOR A WHILE. SOON AS IT'S TOO LATE FOR YOU TO CAUSE ANY TROUBLE, I'LL LET YOU OUT.

—I WOULDN'T BOTHER TRYING TO ESCAPE. NOT EVERYBODY'S AS SWEET AND NICE AS ME, YOU KNOW.

—JANE HARTMAN

PS: THE HEAD WORKS AND THE SINK WATER IS DRINKABLE.

—PPS: YOU SURE ARE PRETTY.

Elmo balled up the note and checked out the foil-wrapped bars. They bore the Matsumi Lines logo, and proclaimed themselves as '*Much Tasty Squid-Flavored Textured Algae Protein Emergency Rationings.*' A closer look showed him that the rock-hard bars were only twelve years past their expiration date.

"Two weeks," he groaned. Back in the toilet (was it some sort of magnetic attraction?) again. Prisoner of some whacked out—he rubbed the knot on his head—and hard-whacking girl who seemed to have the hots for him.

The prisoner of love stretched out on the foam pad that had been left for him. His belly rumbled, but it was going to be a while before he risked his teeth and tastebuds on one of the squid bars. He tried to clear his mind, but was as successful at that as everything else.

He couldn't help thinking that no matter how bad things looked now, they would only get worse when AllMine arrived.

But it was only eight days later that Jane stole away from her work and went to deal with her prisoner. She had been on a twenty-four hour schedule as her father's second in command for so long that she wasn't sure if it was morning, afternoon, or the dead of night.

She was hoping it was the dead of night. A detour to the clinic had let her filch two sedative derms, which she figured ought to keep her prisoner knocked out long enough to let her move him to a new hiding place. She could have used the method she'd employed before, but she didn't want him to get the wrong impression. The plan was to find him sleeping and sedate him. But just in case, she carried a disruptor to settle his hash if he gave her any trouble.

The past few days had been a nightmare. Everybody was in an uproar. She had kept her mouth shut while a search for him was mounted, and made sure she was the one to "search" this area. His vanishing was taken as a sign that he was up to no good. The general run of comments she had heard multiplied her fears that they would space him—or worse—if they found him. Now they were getting ready to move the old hulk up to Big Mother. She had to get him out of there before the project started.

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There was just too much of a chance he'd be discovered in the moving process.

Because of her work load, Jane hadn't had much time for sleep. But when she had slept, she had dreamed of her prisoner.

Remembering some of those nocturnal intermissions brought a dreamy smile to her face as she reached the door. The big OUT OF ORDER sign covered the hastily-installed lock she had put on it. Pressed for time and fearful of discovery, she had used the first lock she found, an antique model that used a key.

Fantasizing that she was about to meet her secret lover, Jane, the gun-toting Juliet, transferred the disruptor to her left hand and put the key in the lock with her right. It went in, but refused to turn.

"Please be quiet," she begged the lock as she jiggled the key. That was another way she took after her father, the way she talked to things. The lock ignored her, forcing her to rattle and twist the key harder. It finally grudgingly opened, but only after what sounded like more noise than she would have made opening it with a sledge-hammer.

She pushed the door open. It was dark and quiet inside. Relief washed through her; he had been asleep and she hadn't wakened him. First pocketing the key and shoving the gun into her belt, she took the two derms and a miniflash from her tool belt.

She smoothed her dress and patted her hair before entering. Some obscure compulsion had made her go home and change into a dress before coming, but she still wore her tool belt. She had considered leaving it behind, but had felt naked without it.

Lighting the path before her, she stepped quietly into the bathroom. *Did he sleep in the nude?* she wondered. According to her dreams, he did, and she hoped the reality measured up to the fantasy. Her light pooled on the foam pad and blanket she'd left for her prisoner. It took her a moment to realize that there was no body—nude or otherwise—under the wadded blanket.

For all her faults, Jane was not slow on the uptake. "Oh shit," she began, whirling back toward the door. That was when she heard a rustle and a grunt of sudden exertion.

She didn't hear anything else for quite a while.

Harsh light flooded the bathroom. Elmo stood there blinking against the glare, the switch under one hand, one of the inedible, foil-wrapped, squid-flavored food bars clutched in the other. Jane was laid out in an untidy, but quite fetching heap at his feet.

"I'm really sorry I had to do that," he told her apologetically as he knelt beside her to check her pulse. It thumped strongly against his fingertips, proving that she was hardheaded in every sense of the word. That was a relief. He'd tried to pull his blow, but whacking somebody with a blunt food substitute was not quite the same thing as slapping them with a lawsuit.

He searched her, doing his best to be gentlemanly about it by starting with the multi-pocketed tool belt at her waist —after taking her gun away from her. He found that she carried enough tools to make him think she viewed the world

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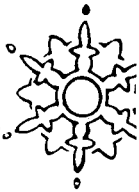

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as something she had to be ready to tear apart or repair at a moment's notice. There were two derms in her hand, probably sedatives. He pondered using them, but decided against it. He had no way of knowing how they would affect someone who had been hit on the head.

A battered comm turned up. He put it aside for later. The roll of black vinyl tape he found next was just the ticket.

A few minutes later he left a securely trussed Jane behind while he reconnoitered his surroundings. Then he came back and made a call on her comm.

Vance reached the billiard room just over an hour later, Bernice and Shorty right behind him. Dick Childress had shot himself in the foot with a foamstone 'muter up on the Mother, and Shana couldn't get away until he was cared for. The three of them were greeted by the strange sight of Jane, wearing a dress and securely trussed with black tape, racked up on the pool table.

"Hi dad," she said, grinning sheepishly. They started toward her, but froze in mid-step when they saw a pale, grim-faced Elmo standing behind her and the disruptor in his hand.

Vance went all poker-faced, keeping himself in front of the others. "Seems to me this is a mite shady, even for an AllMine lawyer," he said quietly.

"Tank was right," Bernice hissed from behind him. "We should have spaced the bastard when we had the chance!"

Shorty pushed his way past Vance, hauling up an old, but still serviceable plasma rifle that was nearly as big as he was. "Say the word, Vance, and this fucker is a legal abstraction."

"Don't let Shorty shoot him, dad!" Jane cried. She turned to gaze at her captor, her face softening and her dark eyes melting like warm chocolate. "I think I love him. . . ."

Vance's eyebrows crawled up his forehead in surprise, but he didn't say a word.

Elmo's face flushed red, and it took him a deep gulp and a veritable flurry of blinking to recover his composure enough to speak. "I, uh, hope you let me talk before that man, uh, shoots me," he stammered. "And I'm not AllMine's lawyer. I'm just a laywer who did a dirty job for them."

"Legal doubletalk!" Bernice sneered. "Blast the sonofabitch, Shorty! I'll scrape up the mess!" Her attitude proved the adage that hell hath no fury like a disappointed humanist.

"No, it's not!" Elmo insisted. "Look, AllMine is going to be here in just a few days, right?"

"Thanks to you," Shorty growled, keeping him in his sights. "But if you hurt that girl, they aren't gonna be able to save your ass!"

"*I'm not a girl, you stupid fu—*" Jane bit back her expletive, not wanting to appear unladylike in front of Elmo. "I'm not a girl," she went on more quietly, "I'm a *woman*." That distinction was directed at the man she'd set her sights on. Just so he'd be sure. "And will you please just *listen* to him for a minute?"

Vance cleared his throat. "Seems like our Jane isn't on the side we might expect. Hormones might have something to do with it, but she's got a good head on her shoulders." He looked Elmo

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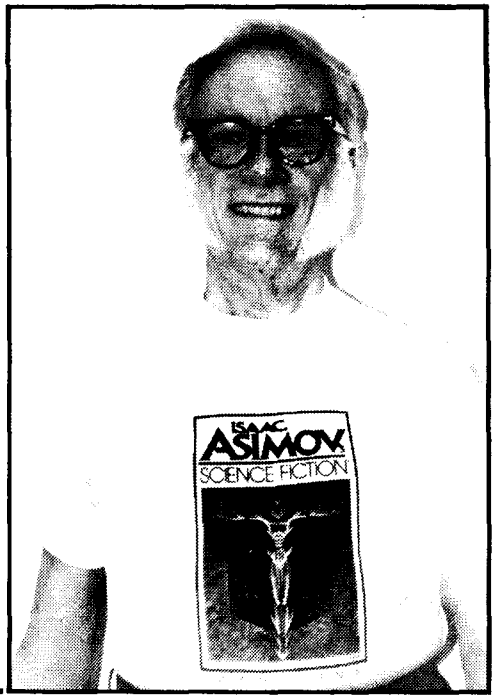

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straight in the eye. "Speak your piece, son. We'll listen."

"Thank you, sir," Elmo told him, weak-kneed with relief. "I tried to get to talk to you a week ago, but I met your daughter instead. She hit me over the head and locked me in a bathroom just down the corridor."

"That sounds like her style," Vance admitted. "So you weren't hiding after all."

"No, sir. I was trying to get to talk with you about the artifact you call Big Mother. AllMine will be here soon, and there's nothing to keep them from stealing it from you."

"I don't see how they could," Vance said. "But you're AllMine's lawyer. I guess you should know about such things, seeing as it's your job to help them do them all legal-like, the way they're stealing Fred's Ball."

"*I'm not AllMine's goddamn lawyer!*" Elmo wailed in exasperation. "I'm just some poor schmuck they sandbagged into doing their dirty work! Because I was broke! And stupid! And desperate! Because I was afraid to say no! Because I was willing to swallow my self-respect for a chance at three meals a day and not having to hock my cat to keep the rent paid!" His voice rose higher as all his bottled up anger and frustration came spilling out. He thumped the pool table with his free hand.

"I let them use me! I delivered those papers to you, knowing all along that you were being ripped off! I did their dirty work! But not any more!" He flung the gun onto the pool table, tore his shirt open. "Go ahead!" he screamed, "*Shoot* me! Don't let me help! I'm a rotten lawyer anyway! Put me out of my misery!"

"Sounds good to me," Shorty said agreeably, stepping forward with his oversized rifle. "Don't move. I'm a rotten shot." Jane paled and tried to wriggle into the line of fire.

Vance pushed the rifle back down. "Easy, Shorty." He turned his attention back to Elmo. "Calm down, son," he said gently. "Can you tell me why you want to help us?"

Elmo sighed. "You're your own man, Mr. Hartman."

A slow nod. "I am."

"Well, that's what I want to be—even if it means I have to be a failure." He tried to think of a way to sum up his life and his situation, but it was hopeless. "Never mind. It's not important." He spread his hands. "I can't even think of one reason you should trust or believe me."

"You threw down that gun," Vance pointed out. "And it wasn't loaded anyhow."

"*Fred's achin' Balls!*" Jane cried, again losing her grip on the ladylike state she was striving to achieve. "Will you two quit feeling each other up? Elmo wants to be our lawyer so's he can stop AllMine from fucking us out of Big Mother!"

Vance looked puzzled. "I still don't see how they could."

"Not the artifact itself," Elmo told him, "But the *idea* behind it." He came out from behind the table. "You didn't register Big Mother's design, did you?"

Vance shook his head. "Never thought of it."

"Well, you can bet that once the AllMine 'xecs see it they'll have a

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whole herd of lawyers doing just that. In AllMine's name, not yours."

"They could do that?"

"If you don't do it first. But we've got to file in a hurry. They've got enough muscle to squash the application if it's still in the works when they find out what you've come up with. They will, too. Your idea is worth millions!"

"Isn't he wonderful?" Jane sighed dreamily. "He was coming to tell you about all this when I conked him on the head and locked him up. He'd still be locked away if he hadn't conked *me* and got loose." Her gaze drifted to Elmo's bare chest. She licked her lips. "He's strong, too. . . ."

Vance stared at his daughter, then at Elmo. "You whacked my Jane over the head?"

He blushed and hung his head. "Yes, sir."

"It 'pears you managed to catch her attention." When Elmo looked up he gave the younger man a wink. "I always kind of figured she'd respond to the direct approach. Now this registering business. What've we got to do?"

It took Elmo a few seconds to grasp the fact that he had a new client. He pulled himself together. "Uh, first I've got to go up there, see it. I'll need stress-coded CADprints and a tight-beam infolink. Oh, and I'll need my briefcomp from back at the ship. I did a little research before, but there's still a lot to do if we're going to beat the deadline."

"Huh." Vance turned toward Shorty. "You better put that gun away before you lose a foot. You haven't got one to spare. Sounds like we need a ride back to the Mother. And can you call Jane's ma and tell her to meet us at the construction shack? Bernice, would you mind going to get this young fella's briefcomp?"

"I suppose I could," she answered stiffly, still not sure if she liked the way things were turning out. "What are you going to be doing?"

Vance grinned. "I suppose I'll be helping Jane's new beau cut her loose. But if he's smart he'll leave her hog-tied, 'cause it's the last time he'll ever have any control over her."

"You're going to go blind staring at that screen like that."

Elmo looked up from his briefcomp. "Oh, hi Vance."

The junkyard owner eased his lanky frame into the chair beside him. "How come you haven't joined the party?" Party was a rather mild word for the raucous, drunken chaos that filled the largest pressured space on Big Mother. A pickup band consisting of two synths, a sitar, a banjo, and a bagpipe churned out a sound that could be defined as music, but beyond that defied category or even strict tempo. The dancing was even more chaotic than the music; you might have called it Wrecking-ballroom dancing.

The lawyer glanced at the celebrating, then looked back at Vance. "I feel kind of like an outsider," he admitted.

"I suppose you would. But that'll pass." He pointed at the briefcomp's screen. The only thing on it was the word *WAITING*. "Think we're going to keep my idea from becoming somebody else's?"

Elmo tried to look more confident than he felt. He had done everything right, but the old Luckless mojo hung

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over his head like a monsoon cloud of doom.

"Ninety-nine percent sure. I ran the paperwork through an old classmate who practices Licence Law just to make sure all the forms were filled and observed. Priority shouldn't be a problem. Nobody's ever come up with anything remotely like this."

That was an understatement. Elmo's first trip inside Big Mother had blown his mind. Shorty had piloted them in through a fifty-meter hole at one end of the slowly turning drum, joining the steady stream of pods, tugs, pushers, and platforms bringing in every conceivable thing that could be stripped from Fred's Ball like bees carrying pollen into a hive.

The inside of the Mother was spread out before him, the lack of braces or struts or girders making it look even larger than it really was. The other end was 400 meters away, and the floor arched all around them almost 250 meters down. Or up.

Elmo had worked it out on his briefcomp as they moved deeper into the Mother. If they built it up to one full level all the way around, they would have a bit over .6 of a square kilometer of enclosed cubic, and almost that much empty floorspace they could use for farms, parks, or anything else that they wanted. Two levels put it up to just shy of two square kilometers.

The inside of the drum had been foamstoned for strength and vac-safety. The floor was dotted with piles of household goods, cannisters, containers, mounds of ore, stone and tailings, life-support equipment, mining equipment, recycling equipment, reels of cable and optic fiber, and as much of Vance's inventory as they had hauled up but not used so far. Here and there were rough foamstone boxes and domes; temporary housing until Big Mother could be closed up and pressurized. The drum had already been spun up to provide .1 gee to keep everything nailed down. Vance told him that later it would be brought up to a comfy level, .5 or so.

They had come in for a landing on a flat, built-up area that had been prepared to receive the old hulk that housed the pool hall, next to the oversized dome that housed construction headquarters. Big Mother's interior was naturally lit, the light streaming in from twelve ten-meter perspyl fish-eyes placed radially around the drum axis at the other end. Included in the plans, but not yet built, was a huge superfilm reflector to gather even more sunlight.

The hulk had since been brought in, the hole closed up, and several large and small airlocks installed in its place. Every spare airco was laboring around the clock to bring the inside up to pressure. Vance and Clovis estimated that after a month they would be able to get by with only breathers. A month after that and the air would be thin, but breathable.

"I used the word 'revolutionary' in the application," Elmo told the father of the revolution, "And your idea is. A normal steel cylhab is an incredibly complex artifact, and just the cost of the materials in one puts it out of the reach of most people. But this . . ." In retrospect it was amazing that nobody had ever thought of making a superfilm cylinder instead of a dome, coating it with ceramyl to make a rigid, self-supporting shell, foamstoning the inside to give it

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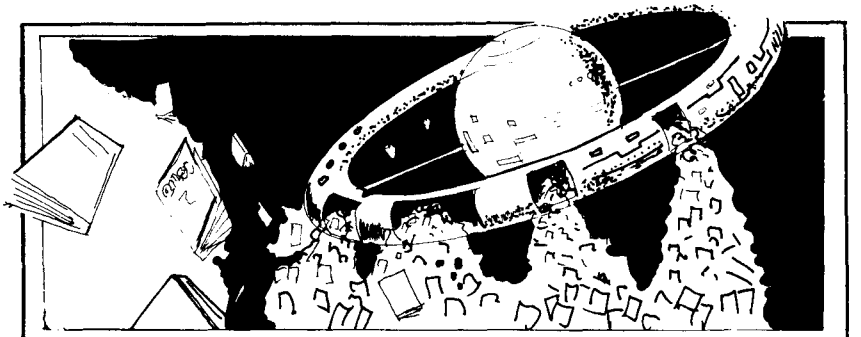

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more structural strength, and then using foamstone to build up as many levels as you wanted. It was the simplest and fastest space housing anybody had ever come up with, and used the cheapest, most plentiful materials.

"The mother was kind," Vance agreed with quiet pride.

"That's something I've been meaning to ask you about. Jane said you figured out how to build it by going to the mother. What's that mean, anyway?"

"Necessity." Reb answered the question as he dropped into a chair across from them. He handed each a squeeze-tube of his finest. "That's old Vance here's personal muse, like. You know, 'Necessity is the mother of invention.' "

Elmo nodded in understanding, obscurely relieved. He had been half imagining Vance praying to some sort of salvage shrine. "I get it now."

Reb's face grew longer. "Well, let's hope the mother ain't shot her wad. We still need her."

"Why's that?" Before Elmo could get an answer to his question, Jane finally managed to break away from the circle of women who had corraled her so they could load her down with useful, and occasionally conflicting advice on how to keep a man.

She slid in beside him, hooking a proprietary arm through his. She'd pulled out all the stops with her clothing and makeup; she wasn't even wearing her tool belt. Her touch, smell, and looks turned Elmo's mind into jelly. She smiled at him. Trembling jelly, melting at the edges. She didn't say a word, she only sat there gazing at him in absolute and unmasked adoration.

"Still with us, son?" Reb asked. Elmo blinked, managed a distracted nod.

"That's good. See, we still got to figure out how to make a livin' now that we've lost Fred's Ball. Half of Vance's salvage is tied up in Big Mother, and we're gonna end up leavin' some of it behind. Most of the rest of us are miners. But what've we got to mine now? We'd rather starve than stay and work for AllMine, and it looks like we just might. We can get enough rock out of that 'roid AllMine palmed off on us to finish the Mother, but that won't put food on nobody's table, and we're one long way from bein' self-sufficient. So what're we gonna do? Mining's all we know."

Elmo stared at Reb, bewildered. "You're kidding me, right?"

"No I ain't kidding, lawyer boy!" Reb snapped. "You figure there's some easy answer in that lawbox of yours?"

"Maybe there is," he answered quietly. Frowning, he typed in a query. After a short pause he tapped in another. What he read on the screen made a big smile appear on his face.

He turned toward Vance. "What would you estimate it would cost to build another Big Mother shell, using new materials—superfilm and crushed, high-silica rock—but not counting labor?"

Vance stared off into space, looking like a big buzzard dreaming of being an eagle. "Oh, say one MCr. One and a half tops, delivered and straight retail."

"That much?" He tried to hide his smile as he turned his briefcomp so they could see the screen. On it was the number 4.826 MCr. "You know what that is?"

"Your goddamn fee?" Reb asked

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sourly.

"Nope. That's the cost of the blueprints for a habwheel this size."

"So?" Reb still didn't see it. But Vance did, judging by the grin creeping out onto his face.

Elmo spread his hands. "Don't you get it? Once the rights come through, you could undercut everybody in hab construction by charging that same amount to build another Mother-hab, and keep *three and a half Meg for yourselves!*"

Reb looked stunned as that number settled into his brain.

"Not only that," Elmo went on, "Once it takes off, you could sell one-time licences for that amount and not even get your hands dirty."

"Wait a minute," Reb begged, holding up his hands. Such good fortune was more than his pessimist's heart could take. "You're sayin' the *worst* case we face would be that once we get the Mother finished, we slide on out to one of the settled areas, have an open house to show'er off, build another, and make more on just that than we've made bustin' our humps for the last ten years?"

"That's about the size of it."

"HOT *DAMN!!*" Reb leapt to his feet and did a manic little dance, then grabbed Elmo and kissed the top of his head. He smooched Jane right after, telling her, "Don't let this one get away, darlin'! He's a—"

Reb froze as Elmo's briefcomp chimed discreetly. His nerves kicking into overdrive, the young lawyer pulled it back to face him and answered the call. He stared at the screen for a long time, his face completely unreadable.

"What's it say?" Jane prompted, nudging him.

"The rights have been approved," he whispered, still unable to believe that he had really and truly done something right.

"All-fuckin-right!" Jane cried, forgetting that the new Jane didn't use words like that. She grappled hold of Elmo and slapped a liplock on him before he even knew what hit him.

"We're gonna be *rich!!!*" Reb bellowed, then thundered off to tell the others.

Jane finally broke for air, finding that her mother had joined her father. Elmo looked like he'd been conked again.

"Jane, honey," Vance said quietly, "Would you go get me and your ma fresh drinks?"

"But dad—"

"Go on, dear," Shana told her, glancing significantly at Elmo. "Unless you want us to lock you in your room tonight. . . ."

Jane gaped at her mother, then blushed. That was something most of the people of Fred's Ball would have expected to see about the time hell froze over. "OK," she meekly. "I get the picture."

Vance nodded. "Thought you might. Take your time. We'll probably be along in a few minutes."

Jane left with no more than a dozen backward glances at Elmo, who sat there feeling like court had been suddenly called into session and he was the defendant. Vance and Shana exchanged a glance that somehow decided he would do most of the talking.

"Well, son, you done good," he told Elmo once Jane was out of earshot. "But there are a couple-three things we have to get straight," he added omi-

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nously.

Elmo wiped his sweaty palms on his pants. "Yes sir."

"Don't look so worried. You aren't in trouble for those two hours you and Jane disappeared last night. It's kind of nice knowing she's finally doing something with a man 'sides making him need to go hide and try to grow his balls back. We wanted to tell you we both noticed that you never told us what your cut from this business is supposed to be."

The shocked look on Elmo's face made both of them smile. "I never even thought about it!" he said, shaking his head. That was pretty amazing, even for him. "Some lawyer, huh?"

"We think so. That kind of tells us that you didn't get into this for the money. Back before, you started to tell me why you wanted to quit AllMine and join our side. But you never finished. Maybe you ought to now."

He looked away shyly. "I don't know if you'd understand."

"Try us."

"All right. You got shafted once, and I had a hand in it, even if I was only delivering the papers. It took me a while, but I realized if I helped shaft you again, or just stood by and let it happen, then instead of just being a lawyer doing a job for them I'd be their lawyer—even if I never worked for them again. There's a big difference between the two."

Vance nodded sagely. "I think we see it. You wanted to do the right thing and be your own man. Well, now you are. It looks like you got yourself a woman, too." That last was delivered with a face and voice suited to funeral arrangements.

Elmo started getting worried again. He looked in Shana's direction. She gave him a wink and an encouraging smile. "I guess I do," he said at last. "I hope you approve."

"I believe we do." Vance leaned forward, suddenly intent. "Now I don't know what you're of a mind to do next, but there are a couple things you might take into consideration. First, you got a piece of all this, just like everybody else. It might have been my idea, but everybody worked on it, and we've always shared what we had out here. You earned your part. Without you there wouldn't have been anything other than a place to live to cut up. Next thing, if this takes off the way you say it will, then it seems to me we're going to need us a mess of lawyering. We'd be a lot happier having someone we know and trust doing it for us."

Elmo tried to swallow the lump in his throat. "Thank you, sir. This is so generous. I—"

Vance held up his hand. "One other thing. You've got more than a woman and a job here. You've also got a family—if you'll have us."

Elmo was at a loss for words. He didn't know what to say, how he could accept or how he could refuse what was being offered him. All he did know was that it appeared his days of living up to the name of Luckless were finally over.

Vance grinned at him. "Well, you think it over." He grabbed Shana's hand and pulled her to her feet. "Let's raise us some hell, darlin'. We've given this poor fella enough to think about for a while."

"You know," Shana told Elmo conspirationally, "If we were to go join the others, you might find a young lady just

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about dying to dance with you. What do you say?''

Elmo closed up his briefcomp and stood up. ''I guess I better, if I don't want to get hit over the head again.''

She laughed. ''That's how I get the old man to dance, you know!''

Vance snorted, putting one arm around her and the other around Elmo. ''You know, son, there is one other thing I should warn you about—besides the Hartman women being no damn good in bed.'' He winced at the elbow in the ribs that remark cost him.

''What's that?''

''Janey takes more after me than her ma, here. Even if we get as rich as you say, she's still going to want to have a junkyard.''

The dancing went on all night, and into the morning when they began the long, laborious job of towing Big Mother out to that distant rock. It took them almost a year to finish the Mother, fit it with a dozen salvaged engines, and reach a place where there would be a demand for the services of the Fred's Ball Memorial Unbelievably Cheap Nearly Instant Hab Building Company.

But after the five years there were Hartman Habs scattered all through the solar system. After ten they had become the standard, and had set off a boom in space housing.

Vance had retired from the salvage business by then, though he sometimes helped build subsidized habs for the poorer settlements to keep his hand in. He spent the rest of his time helping Shana spoil the grandchildren.

They still lived on Big Mother, along with most of the rest of the originals. It was five levels deep now, and the big hollow center was one big park with the old pool-hulk as centerpiece. Vance had turned it into a fountain. There was another Hartman hab chained behind the Mother now; silver letters sixty meters high proclaimed it as the home of HARTMAN SALVAGE—*Junk Bought.*

But never sold. That hab was stuffed with junk and salvage like a mechanical sausage. Something had to be done with the excess. That was the mother of Jane's idea of endowing junkyards. Already she was becoming known as Janey Scrap-pile seed.

The people who had been evicted from Fred's Ball wandered the Belt in the Mother like rich, eccentric nomads, donating a hab here, starting a salvage yard there, and giving AllMine a knee in the fiscal nuts whenever they got the chance. Once a year everybody on the Mother would send a gilt-edged thank-you note to AllMine expressing their gratitude for having stolen Fred's Ball from them.

Elmo kept the money rolling in, and even with their sliding-scale license fee and The Fred's Ball Memorial Foundation's openhanded philanthropy, there was still more than they knew what to do with. There were times Jane's habit of buying any junk she could lay hands on, but refusing to sell so much as a bolt or a cog, drove Elmo nearly around the bend.

But he put up with it. Not only for fear of further head injuries, but because he had come to believe something Vance always said and Jane took as Revealed Gospel.

That was, of course, that given enough junk and the right attitude, anything was possible. ■

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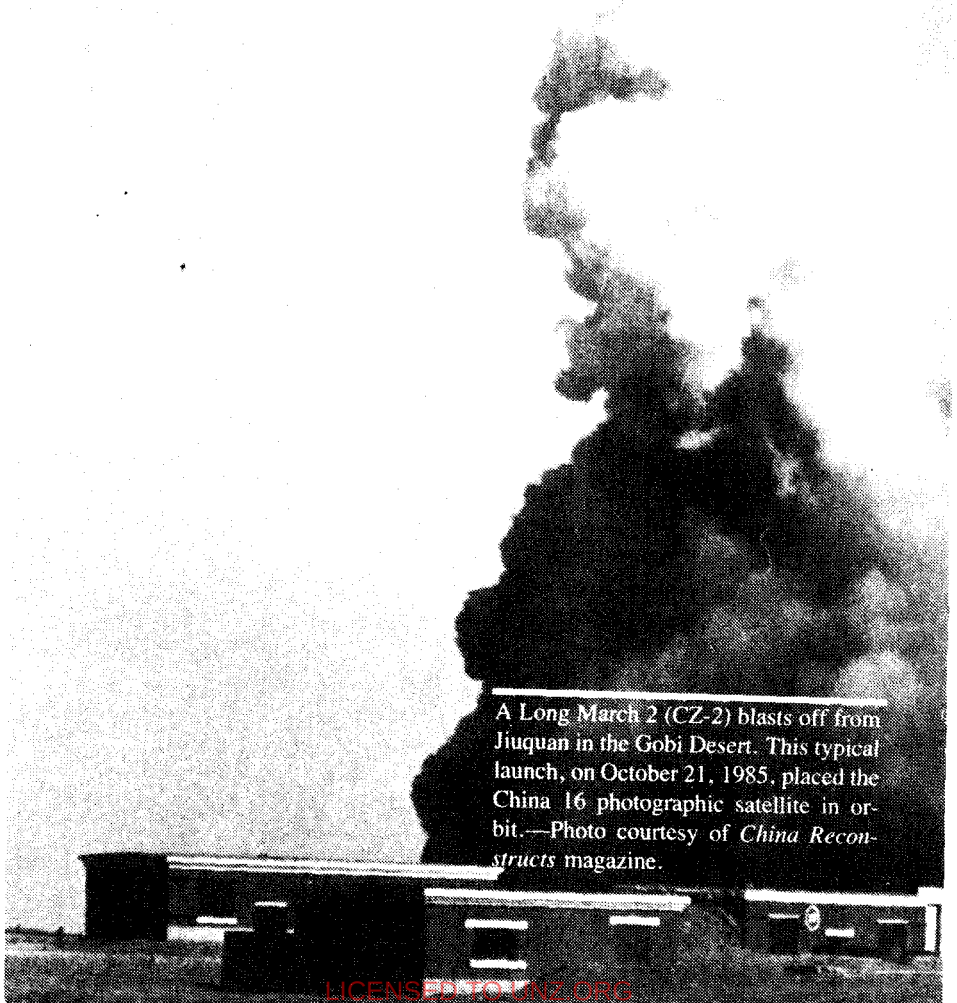
CHINA'S NEW LONG MARCH

Vincent D. Kohler



A Long March 2 (CZ-2) blasts off from Jiuquan in the Gobi Desert. This typical launch, on October 21, 1985, placed the China 16 photographic satellite in orbit.—Photo courtesy of *China Reconstructs* magazine.

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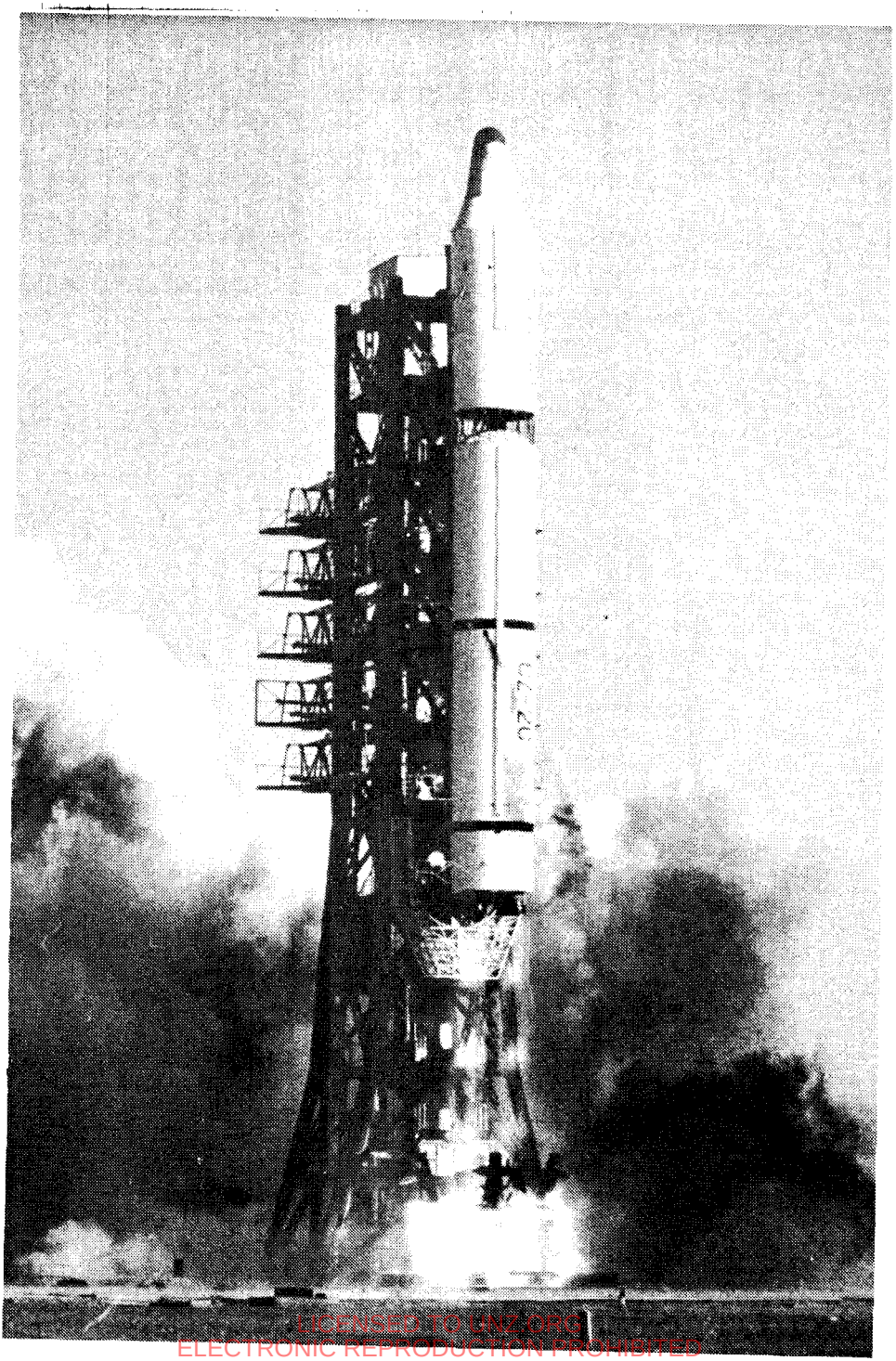

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"Traveling to Sichuan is as difficult as trying to reach heaven."

—Li Taibo, poet,
Tang Dynasty, 617-907 A.D.

The rocket gantry and launching pad stand beside emerald rice paddies tucked among steep red clay hills. Water buffalo graze nearby. The mud-walled villages of turbaned Yi tribesmen lie in sight of the towering gantry: the Middle Ages and the Space Age meet in a setting as remote and exotic as another planet.

This is Xichang Satellite Launch Center in the People's Republic of China. It is nestled in a long, fertile valley below the mountains that wrinkle westward toward the Himalayas in a distant corner of Sichuan province, about 175 miles east of the Burmese border. From here, China, a vast land of dramatic contrasts, hurls satellites into orbit—and someday will send astronauts into space.

In this nation of more than 1 billion people, where peasants follow mule carts near satellite launching pads and the meanest dwelling may be equipped with a personal computer, the fledgling space effort is evidence of a once-closed country's widening consciousness and headlong rush toward modernization.

China has launched 25 satellites, using its growing family of Changzheng (Long March) rockets. Beginning in April 1970 with PRC-1 (or China-1), a 390-pound sphere that whirled around the globe broadcasting the patriotic song, "The East Is Red," Chinese satellites have grown in sophistication to include weather, communications, reconnaissance, and remote sensing spacecraft.

And China has begun launching international payloads. In an effort to earn hard currency and gain technological expertise, China is inching into the commercial launching market controlled by the United States and Western Europe. Slowly but surely, Chinese scientists are acquiring the know-how to launch manned spacecraft. They say they will construct and orbit a 22-ton manned space station by 1998.[1]

That goal is considered visionary by American space experts. But even now China could orbit a two-man spaceship like the *Gemini* spacecraft flown in the mid-1960s by the United States. Research into medical and psychological standards for astronaut selection is under way. Space suits are being developed. Engineers are studying spacecraft design.

Xichang opened in 1984. Dedicated to commercial space launches, the isolated facility will play an increasingly significant role in the Chinese space effort. Xichang has a single operational launch pad. Another is near completion. Payload preparation facilities that meet world standards have been built —improvements intended not only to meet China's own space needs, but to attract international space business, according to Tong Lianjie, deputy director of the launch center, whose position roughly corresponds to the rank of a U.S. Army brigadier general.

The pads and the space center's modest facilities are comparable to those

1. U.S. Department of Commerce. *Space Commerce. An Industry Assessment*. May 1988, pg. 87.

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developed by the United States for the Atlas rocket program more than 30 years ago. But they are adequate for the job. Since January 1984, five satellites have risen into the sky from Xichang atop the Long March 3 (CZ-3) booster, a 144-foot-tall, three-stage rocket that is the centerpiece of the Chinese effort to attract international satellite launching business. The rocket and its larger cousins, the Long March 2 (CZ-2) and the new Long March 4 (CZ-4), could serve as boosters for small manned space vehicles.

The Xichang space center is about 30 miles north of the town of Xichang, accessible only by a 12-hour train ride or an hour's flight over three mountain ranges by turboprop aircraft from the city of Chengdu, more than 200 miles to the north. Planes land on an 11,800-foot runway intended to accommodate jumbo jets. New rail lines also serve the launch complex. Visitors travel from the airfield to the space center down a narrow road full of Third World traffic —bicycles, water buffalo, small rusty trucks and pedestrians toting produce and live chickens—past street markets in brick and adobe villages.

The launch pads are set deep among hills that make them a difficult target for Soviet missiles. Farmers work their fields right up to the low brick wall surrounding the launch complex. When a rocket is to fly, the population is evacuated for a radius of five miles—by the simple and popular expedient of inviting villages to an army-sponsored showing of a Western-made movie or other "cultural event," well outside the danger zone.

Like the rockets, much of the space center's tracking and computer gear is of Chinese manufacture. Xichang's Command and Control Center looks like a simpler version of Mission Control at the National Aeronautics and Space Administration's Lyndon B. Johnson Space Center in Houston. The command center's computers, made in Guangzhou (Canton) in southern China, are slow but reliable, according to Guo Yingjun, vice-director of Xichang's planning department.

Chinese-made tracking gear also is of good quality. Launches are tracked by a tracking center near Xichang. Two optical trackers and a radar system are housed in domed buildings on an arid hilltop there. The trackers are equipped with a laser tracking system as well as infrared, television and direct optical instruments that follow the Long March rockets as they climb toward space.

After the initial boost phase, tracking is handed over to a tracking network that extends eastward across China to include three ships at sea. One advantage of Xichang's location is that satellites, which are launched eastward in the direction of Earth's rotation, still are over Chinese territory when they reach space, said Colonel Michael L. Smith of the US Air Force, chairman of the Department of Aeronautics at the Air Force Academy, who visted the launch center in June 1987.

Foreign visitors to Xichang, such as Colonel Smith, were relatively rare until 1989; now the space center is open to Western tour groups. Xichang's latitude of 28 degrees north, virtually the same as Cape Canaveral's, makes it the ideal

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Chinese-made rocket tracker at Xichang is equipped with radar, optical and laser tracking systems—the first link in a space tracking network stretching eastward across China and including three ships at sea.

Photo by Vince Kohler.

departure point for the West's biggest business—American-built communications satellites destined for Clarke (geosynchronous) orbit 22,300 miles high.

Xichang is one of three Chinese spaceports. The premiere space center is Jiuquan in the Gobi Desert in northwestern China, from which most Chinese satellites have been launched. The newest spaceport is Taiyuan in Shanxi Province about 60 miles southwest of Beijing. Taiyuan orbited its first satellite in September 1988. It is used for polar-orbit launches and military rocket tests.

China's long march into space began in the 1950s with the development of long-range guided missiles under the guiding hand of Tsien Weichang, a Chinese rocket engineer who had immigrated to the United States only to be expelled in 1949 during an anti-communist witch-hunt.

Tsien earned a Ph.D. at Toronto University in Canada and then worked as a research engineer at the Jet Propulsion Laboratory in Pasadena, California. Ordered to return to what was then branded "Red" China, Tsien put his brilliance to work for his homeland. He headed a team of scientists trained in the United States, the Soviet Union, and Great Britain who developed military missiles modeled after the Soviet pattern. Tsien only revisited the United States in November 1972, during the so-called "Nixon Thaw," as leader of a team of Chinese scientists.[2]

By then, China was in space.

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Parallel with the ballistic missiles, Tsien's team had developed the Long March space boosters, beginning with the Long March 1 (CZ-1), a 100-foot-long, two-stage rocket derived from an intermediate-range missile. The Long March 1 is still used in uprated versions.

This rocket orbited PRC-1 on April 24, 1970, from Jiuquan. It seemed faintly ludicrous to the rest of the world that the satellite's instrument payload was a transmitter that broadcast "The East Is Red," a song paying tribute to Chairman Mao Tse-tung. But China, the backward land of mud roads and barefooted farmers, had orbited a satellite on its own. PRC-2 followed in March 1971—a geodetic satellite that transmitted for 12 days before its batteries failed.[3]

There were no more Chinese satellites for over four years. There may have been as many as three launching failures during this period. Mao's great Proletarian Cultural Revolution was heating up—a period of social upheaval that was, as the Chinese now freely admit, a hard time for scientists and engineers.[4]

But when PRC-3 flew in July 1975, China took another step forward in space. The third Chinese spacecraft was a reconnaissance satellite that passed regularly over the United States, the Soviet Union, and Eastern Europe. It was launched with a Long March 2, a much more powerful booster in use today in several versions.

PRC-4 went into orbit in November of the same year. Seven days later, the satellite ejected a recovery capsule that was retrieved. It was proof of the accuracy of China's rocketry, demonstrating the capability of the Long March 2 to place satellites in precise orbits that allowed recovery on Chinese territory.[5]

Satellite retrieval was a key step toward status as a world-class space power. The military uses of satellite recovery technology are obvious. But today the Chinese are marketing recoverable spacecraft for commercial uses—the only nation to do so. The capsules, placed in low Earth orbit (from about 100 miles to 250 miles high) via Long March 2, carry experiment packages that remain in space for five to fifteen days. Ranging in weight from about 45 pounds to about 660 pounds, the relatively small payloads are ideal for many specialized industrial and scientific research purposes—the Chinese answer to the space shuttle's "Getaway Special."

Indeed, the launching services gap left by the *Challenger* disaster and by failures of western Europe's Ariane rocket in 1986 proved to be China's opportunity to join the international launching game.

In August 1987, China launched and recovered a microgravity experiment package for the French company Matra, as a dual payload with a Chinese remote sensing satellite. In July 1988, a West German payload that explored growth

2. Reginald Turnill, *Jane's Spaceflight Directory*. 1984, pg. 32.

3. *Ibid.*

4. Kenneth Gatland, *The Illustrated Encyclopedia of Space Technology*, pg. 44.

5. Turnill, pg. 32.

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of protein crystals in space hitchhiked aboard another Chinese satellite that also was successfully recovered.[6]

Chinese reentry technology derived from that of the Soviet Union with an ingenious, if curious, twist that was revealed to US space experts who visited China in 1987.

The American scientists were startled to learn in conversations with their counterparts that Chinese heat shields were made of wood—"Oak," according to Robert B. Hotz, an official visitor to Xichang who was a member of the presidential commission that investigated the *Challenger* accident. "It's cheap, light, and highly effective."

The oak is ground up and compressed into curved octagonal pressboard sheets that lock together over the metal surface of the reentry capsule. The oak chars and flakes away layer by layer during reentry, protecting the capsule as efficiently as plastic and resin heat shields used by the West until the advent of the space shuttle, with its heat-radiating thermal protective tiles in 1981.

Advanced Chinese space technology development is turning toward the West. The Long March 2-4L (CZ2-4L) booster is designed to utilize American upper stages powered by high-energy fuels such as liquid hydrogen. Another CZ-2 version can use the American PAM-D solid rocket that has been used to boost comsats toward Clarke orbit from the space shuttle. Uprating CZ-2 and CZ-3 boosters with solid-fueled strap-on rockets in the western fashion has been discussed, and the Chinese are developing their own high-energy upper stages for the Long March 3, as well.[7]

China operates a receiving station for data from the US Landsat, in keeping with a primary space goal of marketing launching and remote sensing technologies to western countries. China and Brazil are developing a remote sensing satellite for launch in 1992 that will be used by both countries.

The decision to look westward is paying off: It has attracted the biggest customer of all—the United States.

In September 1988, the Reagan administration took the unprecedented step of approving three export licenses for launch aboard Long March rockets of communications satellites built by Hughes Aircraft Co.

To be lofted from Xichang early in 1990 via Long March 3 is the 1,300-pound Asiasat—the refurbished Westar-6 comsat that was retrieved from a useless orbit by the shuttle *Discovery* in November 1984. It is now owned by a Chinese-British consortium in Hong Kong and will supply television and communications services to Southeast Asia. The other two comsats are being built by Hughes for AUSSAT Pty Ltd., the Australian national satellite operator. They are to fly in 1991 and 1992.[8]

6. G. Lynwood May, "China Advances in Space." *Spaceflight*, November 1988, pg. 431.

7. May, "China—in Business and Advancing Fast." *Spaceflight*, February 1987, pp. 63-73.

8. "Reagan Approves Use of Chinese Boosters to Launch U.S. Satellites." *Aviation Week and Space Technology*, September 19, 1988, pg. 22.

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To attract business, China will fly all three satellites at bargain-basement prices—$30 million for Asiasat's single launch and the same amount for AUSSAT's pair of launches. That is some $60 million less than American launching prices and about $30 million less than the cost of a flight on Ariane.

Launch of a Swedish scientific payload is in the works. The Chinese also are expected to bid on the launch of a new Intelsat communications satellite and a broadcast satellite planned by a group of American television evangelists.[9]

But China's very size—somewhat larger than the United States—and the mainly primitive stage of its technology are obstacles to its drive into space. Certainly manned space spectaculars are years, perhaps decades away.

Computers are relatively few, many electronic products unreliable, the telephone system rudimentary. Information moves sluggishly through a labyrinthine bureaucracy. Much of China is simply preindustrial; the largest population of any nation on Earth is desperate for modern housing and hungry for consumer goods. The economy is massively inefficient. And everywhere is the legacy of Mao's Cultural Revolution that wracked China for a decade, halting the most elementary progress and costing the skills of a generation of technicians and intellectuals who went untrained amid the anarchy.

"During 1966–76, for reasons everybody knows, the development of science and technology stopped in China," said Liu Deming of the National University of Defense Technology in Changsha, where work is under way on manned spacecraft design. "We couldn't train any scientists and engineers. Much research work couldn't continue. But other countries had high-speed development of technology—so we fell behind. Men ask, 'Can we have enough scientists and engineers by 2000?' "

To fill the gap, China is tapping western expertise, especially American. Scientists and technicians take advantage of the Chinese government's popular "openness" policy to invite US experts to their nation in increasing numbers. Chinese aerospace experts make it clear that their ultimate aim is manned spaceflight.

Wei Jinhe, of the Beijing Institute of Space Medicine and Engineering, said aerospace medical research at the school would ultimately lead to selection and training there of astronauts from among Chinese air force pilots.

The Beijing Institute is developing space suits for high-altitude aircraft and for space flight. The Institute operates China's largest centrifuge, in which human and animal test subjects endure as much as nine times the normal force of gravity, simulating the forces experienced in acceleration to orbital velocity. Research is under way into the effects of zero gravity on the human balance system and on the brain's and the body's adaptation to space. There is a high-altitude test chamber where subjects have lived for a month at a time, carrying out simulated space missions.

9. Thomas O'Toole, "The China Syndrome." *Final Frontier*, April 1989, pp. 47-49.

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Space suits comparable to those used during the 1960s by U.S. Gemini *astronauts are under development at the Beijing Institute of Aeronautics and Astronautics.*

Photo by China *magazine.*

A US aerospace medicine team that visited the institute in 1987 was shown a prototype Chinese spacesuit resembling the pressure suits worn by *Gemini* astronauts and crewmen of SR-71 high-altitude reconnaissance planes. Development of the suit began in 1984. It has removable gloves and helmet and utilizes a liquid-cooled undergarment like that worn inside US *Apollo* and space shuttle suits, according to Dr. Walter J. Wiechetek of the Hamilton Standard Division of United Technologies, a key figure in the development of US space suits.[10]

The Chinese are interested in US technical assistance in developing space suits.

Wei said the institute is especially interested in collaborating in manned space work with the United States and West Germany, which managed the Spacelab D-1 space shuttle research flight in 1985 and has plans for another Spacelab mission in December 1991.

Plans to fly a Chinese payload specialist aboard an American space shuttle have been tabled until the 1990s as a result of the *Challenger* disaster, Wei said. Chinese unmanned experiments being developed for the shuttle were also delayed.

When and if a Chinese payload specialist flies on the shuttle, he will study space basics—living in weightlessness and its related problems, the effects of weightlessness on the brain and Space Adaptation Syndrome or "space sickness."

Wei hinted that China might first send astronauts into space in wingless ballis-

10. Craig Covault, "China Developing Technology for Future Manned Space Flight." *AW&ST*, June 29, 1987, pp. 22-23

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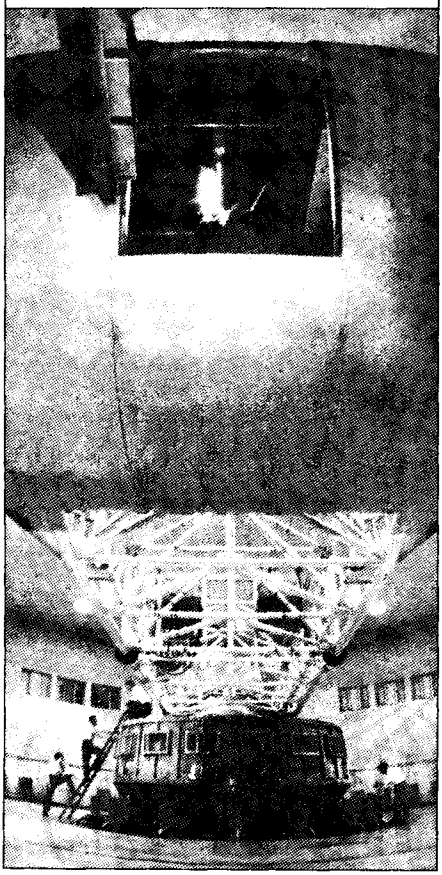
tic vehicles like those American astronauts used in the Mercury, Gemini and Apollo programs and like the *Soyuz* vehicles still flown by the Soviet Union. At first that would be simpler than building a reusable space shuttle, he said.

Massive centrifuge at Beijing Institute of Aeronautics and Astronautics whirls human and animal test subjects through simulated rocket-launching profiles at accelerations of up to nine gee.

Photo by China magazine.



However, National University of Defense Technology professors are intrigued by the possibility of building an advanced space shuttle that would take off and land like an airplane. Such a vehicle is known as a HOTOL, for Horizontal Takeoff and Landing.

"We have some ideas," said Zhou Zhaunan, deputy director of the Changsha University's Department of Mathematics and Spacecraft Systems Engineering. "We are discussing alternatives to the shuttle, including *Hermes* (the European mini-shuttle to fly during the 1990s) and HOTOL. We think HOTOL will be the best, but we are researching everything."

While theoretical work proceeds apace, China faces serious gaps in practical experience and information resources. Facilities clearly are limited. Scientists complain of lack of money. Faculty members at the Changsha defense university in 1987 were unfamiliar with some basic US space shuttle systems —information available in any American library; they were eager to obtain technical materials from the United States. The school even lacked a copy of the report of the presidential commission on the *Challenger* accident, a document freely available and widely circulated in the United States.

The Long March boosters continue to be uprated: The latest in the family is the Long March 4, which put a weather satellite into polar orbit in September 1988. The CZ-2E, to fly in 1990, will be more than 165 feet tall and capable of placing 19,000 pounds in low Earth orbit. The CZ-3A, more

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than 175 feet tall, will be able to throw 5,500 pounds into Clarke orbit. It is set for launch in 1992.[11]

But a much larger Long March —equivalent to the Saturn 1-B that launched US *Apollo* spacecraft on Earth-orbiting flights—is needed before the Chinese can orbit the small space station of which they speak.

The space station would be similar to Spacelab, which is about 24 feet long and 13 feet in diameter, according to Professor S.T. Wu of the University of Alabama at Huntsville's Center for Space Plasma and Aeronomic Research, who visits China annually to meet with professional counterparts.

"I saw the blueprints," Wu said. "It's just like our Spacelab. They plan X-ray studies. They may have something up there by 1998, but the emphasis now is on building hardware. The science projects are on the back burner because they need money for equipment."

With its present capabilities, China certainly could orbit a *Gemini*-type spacecraft before the year 2000, said Craig Covault, senior space and technology editor for *Aviation Week and Space Technology* magazine, who has made three visits to China to report on the space effort and who plans a fourth visit in autumn 1989.

For now, China pins its hopes on u manned space flight—and its space successes have gotten the attention of American experts such as Covault. They say the country will be a force to be reckoned with in space.

"Considering the condition of the country and the stage of its development, it's an impressive record," Covault said.

But it remains to be seen whether China can launch satellites fast enough to attract significant commercial satellite business.

The three US launch companies —Martin Marietta Co., McDonnell Douglas Corp. and General Dynamics Co.—take the threat seriously. They think Chinese competition could force at least one of them out of the business. By industry estimates late in 1988, the commercial launching market cannot support current competitors, not to mention adding the Chinese.

Fifteen to twenty commercial satellite launches are required annually worldwide. About half of them are handled by Arianespace, the West European space consortium. If another four satellites were to be launched by China, six or fewer satellites would be left to the three American companies. So little traffic could lead one and possibly two of the American companies to quit the business.[12]

The US-made comsats originally were to have been launched during 1988. But the launches were stalled in part because the United States insisted on concessions from China to protect the American launching industry.

In return for the comsat export licenses, China agreed to launch no more

11. Covault, "China Agrees to Limit Marketing of Long March Booster in U.S.," *AW&ST*, January 2,1989, pg. 37.

12. *AW&ST*, Sept. 19, 1988, pg. 22.

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than nine international comsats through 1994 and to maintain launch prices on a par with world markets instead of subsidizing launch services. Even so, if China is able to sign up nine customers through 1994, it will earn as much as $500 million in business that would have gone to US launching companies or to Arianespace.

While the agreement limits the impact of Chinese competition on the US commercial launch industry, it also recognizes China's position in the international space market.[13]

If the pickings for China are rich, they are far from easy. The Long March still lacks the accuracy of Ariane or of Titan, Atlas and Delta; advanced versions of all four tried-and-true western boosters soon will be in the sky. Long March customers must store extra maneuvering fuel aboard their satellites, at a cost of about $10 million or about nine months' of orbital lifetime. And another potent competitor is on the horizon: Japan will field a booster that could be used for commercial launch operations in 1992.[14]

The Chinese claim they can launch ten to twelve satellites per year. But so far, their busiest year in space was 1988, when they lofted four satellites. Under the rising pressure of competition, China's reach could exceed its grasp: Trying to launch too many satellites too quickly to drum up demand or to keep pace with other countries could easily lead to catastrophe.

Such a blunder by the United States culiminated in the *Challenger* explosion, according to Robert B. Hotz, who said the Chinese pattern of space success so far resembled that of the American manned space program before the shuttle accident.

During its pre-*Challenger* manned space program, Hotz said, the United States attained consistent success by launching a small number of flights at a slow rate with cutting-edge technology. The decision to increase drastically the rate of space shuttle launches to attract commercial launching business was a contributing factor to the *Challenger* tragedy, he said.

But Hotz, like others, said China is in space to stay.

"This is a serious space program," Hotz said of the Chinese effort. "The thing that impressed me is the size of the Chinese space program, the massive commitment. They've got two launch sites and now a third. They've got a couple of tracking ships and a communications network. They've got a light booster they're converting into a heavy booster. There is a lot of brains and money and concrete and steel that's

13. Covault, *AW&ST*, Jan. 2, 1989, pg. 37.

14. O'Toole.

TABLE 1: Successful Chinese satellite launches, 1970–1988

NAME	LAUNCHED	ROCKET	SITE	MISSION
PRC-1	4/24/70	CZ-1	Jiuquan	In orbit; 1st PRC satellite
PRC-2	3/3/71	CZ-1	Jiuquan	Geodetic; decayed

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PRC-3	7/26/75	CZ-2	Jiuquan	Reconnaissance; decayed
PRC-4	11/26/75	CZ-2	Jiuquan	Reconnaissance; capsule recovered after 7 days
PRC-5	12/16/75	CZ-2	Jiuquan	Reconnaissance test?
PRC-6	8/30/76	CZ-2	Jiuquan	Reconnaissance
PRC-7	12/7/76	CZ-2	Jiuquan	Reconnaissance
PRC-8	1/26/78	CZ-2	Jiuquan	Recon.; capsule recovered 1/30
Triple payload:				
PRC-9)	9/19/81	CZ-2	Jiuquan	Atmosphere study
PRC-10)				Earth resources
PRC-11)				Earth resources
PRC-12	9/9/82	CZ-2	Jiuquan	Remote sensing; capsule recovered after 5 days; recon. test?
PRC-13	8/19/83	CZ-3	Jiuquan	Deployment & recovery techniques; poss. operational recon. satellite; capsule recovered 9/3.
PRC-14	1/29/84	CZ-3	Xichang	Experimental GEO comsat? 3rd-stage failure? Apogee kick motor fired in LEO; poss. successful 1st test of CZ-3
PRC-15 (STW-1)	4/8/84	CZ-3	Xichang	Experimental GEO comsat at 125 deg. E. long.
PRC-16	9/12/84	CZ-3	Jiuquan	Photo recon.; recovered 9/29
PRC-17	10/21/85	CZ-2	Jiuquan	Land resources; recovered 10/26
STW-2 (PRC-18)	2/1/86	CZ-3	Xichang	GEO domestic comsat at 103 deg. E. long.
PRC-19	10/6/86	CZ-2	Jiuquan	Earth resources; recovered 10/11
PRC-20	8/5/87	CZ-2	Jiuquan	Microgravity experiments, incl. French commercial payload; recovered 8/10
PRC-21	9/9/87	CZ-2	Jiuquan	Remote sensing; recovered 9/17
STW-3 (PRC-22)	3/7/88	CZ-3	Xichang	GEO comsat
PRC-23	8/5/88	CZ-2	Jiuquan	Microgravity experiments, incl. West German payload; recovered 8/13
Feng Yun-1	9/6/88	CZ-4	Taiyuan	1st CZ-4 launch; weather satellite in SSO polar orbit; failed after 12 days
STW-4	12/22/88	CZ-3	Xichang	GEO comsat

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TERMS: GEO = Geosynchronous orbit ("Clarke orbit"); LEO = Low Earth orbit; SSO = Sun-synchronous orbit.

SOURCES FOR TABLE: *TRW Space Log. 1957–87; Spaceflight,* February 1987 and June, November and December 1988; *Aviation Week and Space Technology,* Sept. 12, 1988; *The Complete Encyclopedia of Space Satellites,* 1986, ed. by Giovanni Caprara.

going into this thing."

China's first attempt to launch a satellite, on Nov. 1, 1969, from Jiuquan aboard a Long March 1, ended in failure.[15] There may have been as many as three consecutive launch failures at Jiuquan in mid-1974 with Long March 2 vehicles. An attempt to launch a scientific satellite aboard a CZ-2 from Jiuquan on July 30, 1979, also failed.[16]

TABLE 2: Chinese space boosters

TYPE	STAGES	LENGTH	LAUNCH MASS	PAYLOAD/REMARKS
CZ-1 (1970)	3	101 ft.	89.7 tons	660 lbs. to 265 mi. circ. Solid-fueled 3rd stage
CZ-1C* (1986)	3		96.8 tons	880 lbs. to 350 mi. circ. Liquid-fueled 3rd stage
CZ-1M*	3			Lengthened
CZ-2 (1974)	2	107 ft.	212.3 tons	3.3 tons to 240 mi. circ.
CZ2C-MSM (1981)	2			Multi-satellite mission capability
CZ-2C-OTM*	2 + Orbital transfer module			
CZ-2D-Pam-D*	2 + U.S. Pam-D			1.9 tons to GEO
CZ-2E (1990)	2 + 165 ft. 4 strap-ons			9.5 tons to LEO. Stretched 2nd stage
CZ-3 (1984)	3 3 + 170 ft.	144 ft.	218.5 tons	1.5 tons to GEO
CZ-3A (1992)	strap-ons			2.75 tons to GEO
CZ-4 (1988)	3	137 ft		2.7 tons to SSO; 2.2 tons to GEO
CZ-4L (1991)	3 + 4 strap-ons			5.8 tons to GEO

15. May, *Spaceflight,* Feb. 1987.

16. Gatland, pg. 44.

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SOURCES FOR TABLE: *Spaceflight*, February 1987; *Aviation Week and Space Technology*, Jan. 2, 1989; Gatland, *The Illustrated History of Space Technology*.

Long March rockets burn nitrogen tetroxide fuel and the oxidizer unsymmetrical dimethyl hydrazine (UDMH) in the first and second stages. Third stages burn liquid hydrogen and liquid nitrogen, both high-energy fuels. The CZ-2E and CZ-3A will have solid-fueled rockets strapped around the base of the first stage in various combinations, in the same way that solid rockets are used with the U.S. Delta and European Ariane to increase thrust.

*Several listed variants, especially of the CZ-2, were advertised in 1987 by Great Wall Industries Corp., the Chinese space marketing agency, but have not yet flown space missions. Some of the CZ-2 versions likely will remain "paper studies" only.

A CZ-2 variant known as the FB-1 (Fengbao = "Storm") was used to launch non-recoverable satellites from Jiuquan between 1974 and 1981. It was slightly lighter and had somewhat different electronics from the parent type; the FB-1 is no longer used.[17]

TABLE 3: Chinese recoverable satellites

MISSION	FSW-1	FSW-2
Dedicated satellite	(1 customer)	
Recoverable	330 lbs.	440 - 660 lbs.
Non-recoverable	330 lbs.	660 lbs.
Industrial co-passengers	(2 customers)	
Recoverable	44 lbs.	660 lbs.
	4.5- to 22-lb. packages	33- to 44-lb. packages
Altitude	105-265 mi.	same
Duration	5-8 days	10-15 days
Power	27 V, 100 W	27 VDC

FSW = "Fan Shou Weixan" (Recoverable satellite)

17. May, *Spaceflight*, Feb. 1987. ■

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SOURCE FOR TABLE: *Spaceflight,* November 1988.

About the Author

Vince Kohler is a staff writer for *The Oregonian* daily newspaper in Portland, where he reports on science and politics and reviews science fiction. Kohler toured space installations throughout China in 1987 with a group of aerospace experts and journalists. He has filed stories from Xichang Satellite Launch Center near Burma; Lyndon B. Johnson Space Center in Houston; George Marshall Space Flight Center in Huntsville, Alabama; and European Space Agency headquarters in Paris. He belongs to numerous professional organizations including the American Astronautical Society, the British Interplanetary Society, the Aviation and Space Writers Association and the Science Fiction Research Association.

"Rainy North Woods," Kohler's first novel, a comic thriller with science-fiction elements set on Oregan's rainy South Coast, will be available in the fall of 1990 by St. Martin's Press.

●Nothing in education is so astonishing as the amount of ignorance it accumulates in the form of inert facts.

Henry Adams
Submitted by John Hradsky

●Science progresses best when observations force us to alter our preconceptions.

Vera Rubin
Submitted by John Hradsky

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futures

Matthew J. Costello

I was sitting across from George Alec Effinger as he peered over the Nebula he had just won for his marvelous story, *Schrödinger's Kitten*, when he said something that surprised me. We were at a banquet hosted by our agent and the subject was games.

"I really wish you had kept the columns the way they were," George offered. He went on to say that he enjoyed games—a lot—and he depended on the columns to give him some idea about what to buy. But I told George that the "other worlds" of SF needed coverage, and I wanted to do it. And though the column covers films, video, and comics, games would always be an important part of it.

He nodded, and we went back to talking about games, past, present and to come. But, reminded of my duties, I made a note to do a survey of important new games. So, George, this one's for you . . . .

Origin Systems Inc. (136 Harvey Road, Building B, Londonderry, NH 03053) has just released *Ultima V*, the latest in its best-selling role-playing saga by Lord British. The game opens with a lengthy sequence of text and graphics, explaining the bad stuff that has befallen Britannia. You get to devise a hero whose characteristics are determined by a series of intriguing value questions.

For example, you slay a dragon but some other poor slob of a knight, hungry and destitute, claims the kill, and the prize. Do you challenge him or let the poor failure take the ill-gotten reward? After a series of questions, your hero is reunited with two compadres from an earlier Ultima adventure. Then it's off to the wilds of Britannia. The party is represented by a small knight icon. The landscape is well detailed, especially the interior of the castles and cities. There are some nicely animated sections, with sound effects, and battles are fought with your full forces.

Ultima V is the best computer rp game I've seen yet. Like most computer game companies Origin is making its games easy to play and graphically involving.

Space Quest III is the latest animated adventure from Sierra-On-Line (Coarsegold, CA 93614). These games, with their musical scores, their cartoon-like animation, and amazing depth of play, are state-of-the-art in computer games. *Space Quest III* seems to push the limits even further. Your hero —Roger Wilco has his shuttle craft kidnapped by the Pirates of Pestulon, and he has to avoid dangerous conveyor belts, robot monitors, and gain entry into the pirate's vessel.

Search for the Titanic (Capstone, 14160 S.W. 139th Court, Miami, FL 33186) is less a game than an adventure/simulation. The program leads you through a series of deep water explorations, searching for wrecks, manipulating underwater sleds loaded with cameras, as you build up to the big

(Continued on page 82)

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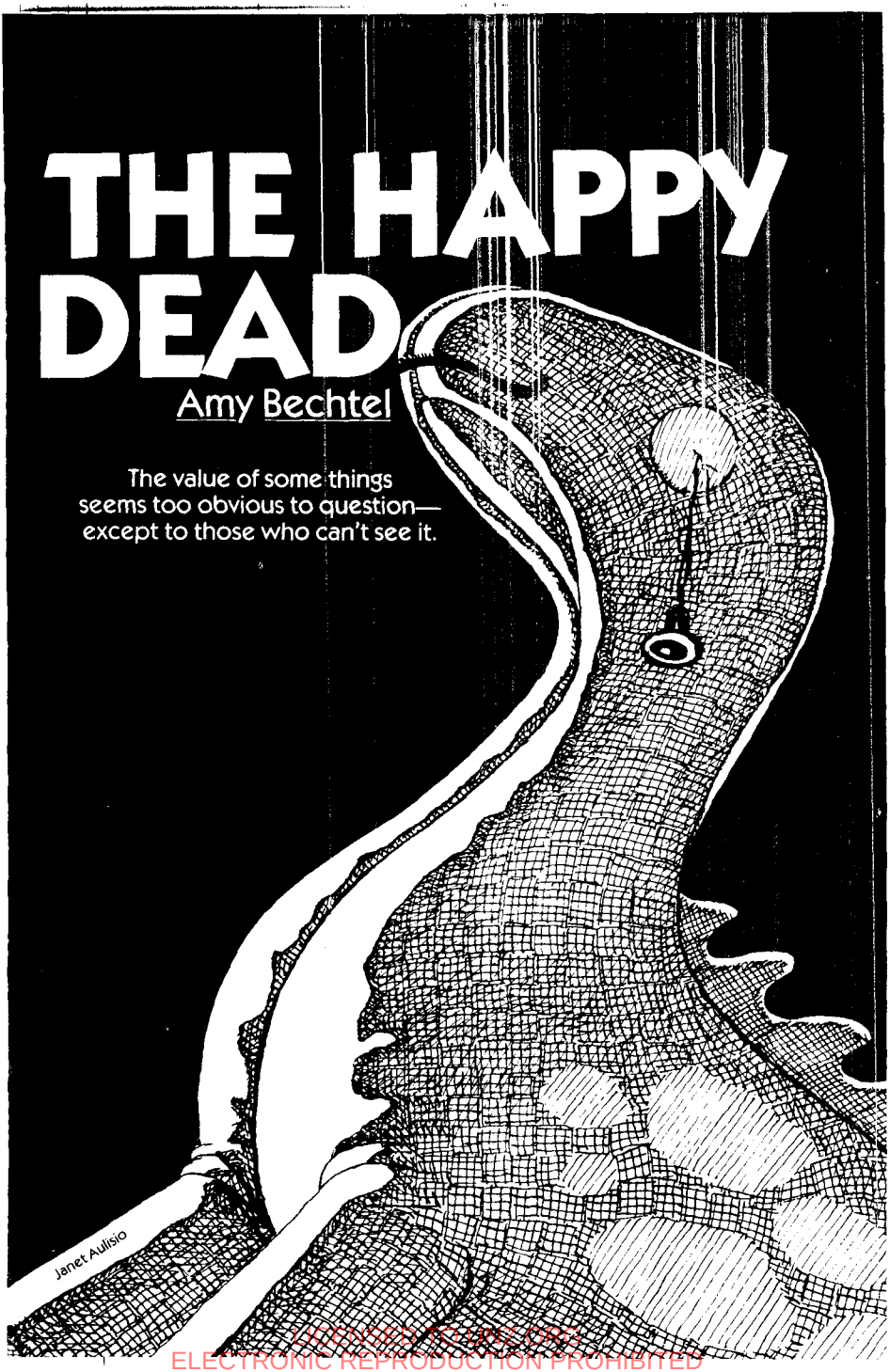
THE HAPPY DEAD

Amy Bechtel

The value of some things seems too obvious to question—except to those who can't see it.



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Neonatal intensive care was eerily silent. In the well-baby nursery down the hall, babies cried and squalled and made a fuss at all hours of the day and night, but in NICU the babies were too sick to cry. The machinery whirred and hummed, the nurses talked in low tones, and alarm bells went off with monotonous regularity. It was crowded in NICU: twenty babies in incubators, a dozen nurses, assorted doctors, and visitors—mothers and fathers, sisters and brothers, grandparents. Most of the visitors looked out of place and uncomfortable in hospital gowns, and the children bumped into the busy nurses.

Baby Irena had no visitors this evening. The colorful blanket and the stuffed toys in the incubator—giraffe, teddy bear, and bright-red dinosaur —implied love and attention, but nobody was there. Valerie Ryan stood watching Irena, who lay very still, breathing in time with the ventilator. The baby was attached to all manner of IV's. While the nurse was busy writing an entry in Irena's chart, Valerie slipped up to the incubator, reached inside, and gently touched the baby. Instantly she flinched and drew away, as if she had had a shock.

"Excuse me! Who are you, please?"

The nurse was staring at Valerie accusingly, as if Valerie were a child molester. Valerie hastily showed her name tag, VALERIE RYAN M.D. hand lettered in blue above a teddy with a red bow around its neck.

"I'm one of the new pediatric residents," Valerie said. "I'm on the next rotation here, starting tomorrow."

"Oh. All right, then." The nurse went back to her paperwork, obviously still not approving of Valerie's presence. Valerie had heard that NICU nurses were quite protective of their babies; this was unquestionably true. She moved away from Irena, not wanting to antagonize the nurses before she even started working here, and went on to have a look at the other babies. Irena was the only one on a ventilator; none of the others looked half as critical. Valerie had no doubt, with her luck, which baby she would be assigned.

She left NICU, stripped off the green gown, and tossed it down the laundry chute. In the records room she found Irena's chart, which was four times as thick as the other babies'. The last resident had already written the case summary on the file.

CASE SUMMARY

Irena Zarate is a premature child born at 23 weeks gestation. She weighed 700 grams at birth and is now up to 1.7 kg. (age now two months). Irena has been apneic since birth. She was immediately intubated, given surfactant, and placed on a ventilator. All attempts to wean this child from the ventilator have been unsuccessful. Severe bronchopulmonary dysplasia has developed secondary to use of the ventilator.

This unfortunate child also has severe microcephaly, has suffered an intraventricular bleed, and must be continuously medicated to control seizures. The neurologist's report states that chances of normal neurologic development are essentially nonexistent. Irena additionally suffers from retrolentar fibroplasia, grade 4, due to the high levels of oxygen required to keep her alive.

Irena's mother, Carmen Zarate, is

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single, on welfare, and has one other child (age four). The mother neglected to obtain prenatal care and currently seems confused about Irena's status. She visits less and less often, now only once per week at best. It is my opinion that if this child survives, the mother has no intention of taking her home.

Please see the more detailed Problem Lists on previous pages. Whoever picks up this case, feel free to contact me if you have any questions.

R.L. KAYE M.D.

Valerie gazed at the voluminous pages of records and realized that though Irena had been intensively treated in hospital for two months, she still had another two months to go before she *ought* to have been born. No wonder she looked like a newborn mouse, not fully formed, not yet ready to live. The detailed problem list was pages long: Irena was blind and severely brain damaged, she couldn't breathe, couldn't eat, and didn't have a hope, barring a miracle, of survival. Or would it be a miracle if she survived? Valerie shivered as she remembered the touch of her hand on the baby's skin, the pinpoint of awareness she had felt which was aware only of pain.

The psychologist's office was richly carpeted, lined with books on beautiful stained oak shelves. Valerie sat in the chair, feeling uncomfortable, small, and grubby, no longer quite sure why she had come. She realized she had no intention of telling the psychologist what was bothering her, so how could she expect help? She sat rubbing her hands together, noticing that her skin was dry and was cracking painfully; too much scrubbing, too much medicinal soap.

"Medical internship is terribly difficult," the psychologist said warmly. "It's normal for this to be the most difficult year of your life."

Valerie smiled and nodded, resisting the impulse to make a sarcastic comment.

The psychologist frowned and said, "But where is your support group? Your social life is abnormal; you're thirty and you live alone and you have no steady relationship; you should go out and meet people."

Valerie politely replied that starting tomorrow she would be working seven days a week with every third night on call; when was she supposed to go out and meet people? Silently, she thought that it was difficult to have a real support group when there were certain things about oneself that one had to keep secret, always. No one was going to be able to help her.

Valerie drove home, thinking of Jimmy. She hadn't thought of him in a long time; she had driven him away with a schedule only half as bad as this one. She had never meant to forget his birthday dinner date. She didn't even remember falling asleep. One moment she had been coming into her apartment after work, fully intending to shower, change, and meet Jimmy; the next moment she woke up on the floor, and it was one o'clock in the morning. She had promised to meet Jimmy at the restaurant at eight. Jimmy was terribly hurt, and never understood that she had not done it on purpose. Perhaps no one could understand that degree of exhaustion without having experienced it:

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the kind of exhaustion that comes after months of sleeping two or three hours a night, when all that keeps one going is forward momentum. Valerie still considered four hours of sleep in a night to be a mecca; possibly, she thought, this was not normal.

Valerie celebrated her last free evening with a glass of wine and a good book, which lasted until Subway the cat knocked the glass over, spilling puddles of wine across the pages.

Valerie drew four babies for her patient list when she started NICU rotation the next day; as she had suspected, one of them was Irena.

"Now, Dr. Ryan," her attending said, as he assigned the cases, "you've drawn the most interesting case, so I'd like you to give a talk tomorrow during rounds on—oh, let's see: bronchopulmonary dysplasia, first, and also the causes of seizures in premature infants. Now, moving right along—"

Valerie hung back for a moment, reaching out to Irena to touch her one more time. The feeling was the same: the pinpoint awareness, the horrendous pain. Irena knew nothing of Valerie, of her devoted nurse, of the stuffed red dinosaur nestled in her incubator. She only knew the pain. How can *I* stand it? Valerie thought. How? The nurse, still hostile, said, "You'd better keep up with your group, doctor. They won't repeat anything." Valerie left the nurse alone with the oblivious infant, and ran to catch up.

She got through the rest of the day without having to touch Irena. She handled her other three patients without any trouble (she felt what was there, then turned it *off*, just as she normally could); all of them had aches and pains and they wouldn't have *been* in NICU if they weren't critical, but all were improving and were on their way to recovery. Jessica and Ralph were preemies who were gaining fast; they'd graduate to the nursery by next week. Deirdre was post-surgical; when Valerie looked at her record, she remembered a grocery checkstand and a tabloid headline, BABY BORN WITH TAIL!!—the exclamation points implying that this was something astonishing. Deirdre had been born with a tail, extra toes, missing fingers, and a cleft palate; she'd had two operations already and another was scheduled for the end of the week, but by the time the surgeons were finished, Deirdre would be able to go to first grade without fear of rejection or humiliation.

Valerie went home in turmoil, and stayed up till three in the morning (enviously watching Subway snooze on the desk), reading about bronchopulmonary dysplasia, a brand new lung disease *caused* by the ventilator and about which relatively little was known, and the hundreds of causes of preemie seizures, about which altogether too much was known.

Valerie stumbled through rounds the next morning without making too much of an idiot of herself, and later tried to make friends with Irena's nurse. The nurse defrosted slightly and introduced herself as Judy Jamison; she had been caring for Irena since the child's birth.

"And a good thing, too," Judy said, as she marked the day's ventilator settings on the chart. "She's a precious

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baby, and needs someone to look after her. Her mother doesn't care."

Valerie looked at the bright toys in the incubator and said, "But she brought the toys, didn't she? And she visits."

"*I* brought the toys," Judy said, "and she certainly doesn't visit very often. When she does, she just stands there. She doesn't hold the baby, doesn't give her love and affection. Doesn't even like to touch her." Judy gave Valerie a pointed look at that, and Valerie hastily finished writing out her orders for Irena and moved on to her next patient.

That night Valerie discovered that the rumors about overnight call on NICU were true; she didn't get any sleep at all. It was incongruous, since the nurses knew what to do better than Valerie did, but they weren't allowed to do anything without a doctor's OK, and the babies' conditions changed too rapidly for her to just write an order sheet and go to bed. Besides, she was too nervous to sleep. Even after Judy Jamison said goodnight to baby Irena and went home, Valerie was too nervous to sleep.

It was a quiet night: no new admissions, only one disaster. Irena managed to extubate herself at the very same time the supervising third-year resident vanished to the bathroom, and quite suddenly Valerie was the only doctor in sight, while off the ventilator, Irena was rapidly turning blue. Valerie had never had the opportunity to intubate a baby before. The nurses expertly positioned Irena while Valerie, hands trembling, fumbled with tube and laryngoscope. She steadied one hand against the baby's face as she hunted for the laryngeal opening, and Irena's struggle for breath washed over her, on and on, making her hands shake even harder. The tube bumped against the palate, twanged the epiglottis, and finally slipped, blessedly, into the trachea. Valerie backed away, still trembling all over, as the nurses set about the business of bagging the baby with oxygen and getting the ventilator going again. Slowly Irena's sick blue-purple coloring faded back to pink; as the oxygen brought her back to life, Irena moaned, a low, mournful sound. It was the first sound Valerie had ever heard her make, and it sounded like a protest, a miserable complaint: I was going! Why did you have to bring me back?

The supervising resident wandered in, took in the situation, and casually told Valerie, "Good job. You were lucky, you know. Most interns don't ever get to do an emergency intubation; be glad you had the chance." Valerie stayed away from Irena for the rest of the night.

It was more than a week before Irena had a visitor. Valerie met the baby's mother, Carmen Zarate, at the scrub sink. Carmen was in her thirties, small and plain, her hair in a long black braid.

"I'm Dr. Valerie Ryan," Valerie said. "I'm looking after Irena now."

"Another doctor? You're the third one."

"I'm sorry if it's confusing. We change rotations once a month. Most of the babies aren't here long enough for it to matter."

Carmen shrugged, and finished scrubbing her hands. Valerie walked with her to Irena's incubator, noticing that Judy Jamison studiously turned

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away and busied herself with paperwork as they approached. Carmen stopped short of touching Irena, and looked at her.

"She looks worse," she said. "Is she, doctor?"

Valerie said, "She's really about the same."

"But no better."

"No. Not at this point."

Carmen sighed and reached into the incubator, adjusting the position of the stuffed dinosaur, but she didn't touch the baby.

"It hurts to look at her," Carmen said. "Doesn't she hurt, doctor? Doesn't she have pain?"

"Yes," Valerie said.

Carmen looked startled, worried. "The other doctors, they said no, probably she doesn't feel it. You think she does?"

Valerie was abruptly aware of Judy Jamison, who sat with her back turned to them, listening. Valerie said, "I think she probably does. I don't see how she couldn't feel *some* pain, with all the problems she has."

"It shouldn't have happened," Carmen said. "I didn't get any of that prenatal care. I don't have any insurance. I couldn't afford it."

"It might not have made any difference," Valerie said.

"But maybe it would have. They wouldn't give me any prenatal care, because I couldn't pay. But now they say, don't worry about money; if you can't pay, the hospital will still take care of your baby. Why will they spend all this money *now*—now that it's too late—when they wouldn't spend anything to stop it happening?"

Judy Jamison turned around and said, "We're taking care of your baby because all lives are important. God has a plan for everyone."

"This is the plan? *This?*"

"Sometimes it isn't easy to understand," Judy said, but Carmen wasn't listening; she was already halfway across the room, fleeing from Judy, from her baby. Valerie followed her, past the laundry chute, through the double doors, and into the wide, bustling hallway.

"It's a sin, a terrible sin," Carmen said, "but I want Irena to die." She was crying, silently, the tears simply sliding down her face. She turned to Valerie and said, "How can I want that? *How?*"

Carmen fled, dodging the crowds through the corridors; Valerie got tangled in a bevy of wheelchairs, and by the time she pushed open the doors to the parking lot, Carmen was gone. Brilliant sunlight bounced off car hoods and headlights and chrome, and the asphalt was hot; the Sun shone bright enough to burn Valerie's eyes. It had been a long time since Valerie had seen the sun. It made her think of the macabre list someone had pinned to the wall in the intern's sleeping quarters: You know you've been an intern too long when (1) Sunlight hurts your eyes, (2) You look deep into your lover's eyes and pull out a penlight, (3) While performing autopsies, you think about lunch.

The list got worse from there, and too many of the items held true. Valerie squinted painfully at the Sun and let the doors fall shut, returning to the dim, cool fluorescence of the hospital.

When Valerie returned to NICU, Judy confronted her and said, "Why did

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you tell Mrs. Zarate that her baby was in pain?''

''Because she is.'' Valerie was taken aback. Bright spots of Sun were still in her eyes, obscuring her vision; she could not read the nurse's expression.

''So you're the expert now? You're right, and all the other doctors are wrong? You haven't got any business telling a parent something that contradicts what the attendings have told her.''

Judy angrily turned away, and Valerie sighed and looked down at Irena in the incubator. Of course the others weren't aware of the baby's pain; how could they know? She was the only one who knew.

Halfway point, Valerie thought: fourteen more days. On call night, she sat in the quiet records room, working on Irena's chart. All of Valerie's other patients had come and gone, but Irena stayed on, never getting worse, never getting better. Valerie was afraid that she might *not* drift gradually into death. She might live on and on, just as she was today.

Valerie closed the chart, took out an old AMA journal, and opened it to a well-thumbed article: ''It's Over, Debbie,'' by Dr. Anonymous, who claimed to have euthanized, with an overdose of morphine, a cancer patient who had begged him to let her die. There was still controversy over whether this case was real or hypothetical, but Valerie knew such things had been done; indeed, she had done them herself. Her method was more difficult to track down than an overdose of morphine.

It first happened when she was in high school; already thinking ahead to a career as a doctor, she took a part-time job as an aide at a nursing home. The oldest person there was a ninety-eight-year-old great-great-grandmother, bedridden and helpless, fed through tubes, turned and cleaned by aides. She never noticed anyone or anything, not even her closest family. When Valerie touched her she felt only misery, without the least spark of hope or happiness or cherished memory. Months went by without a change until one day, while Valerie was changing her sheets, the old woman reached out and caught her hand, and something happened. Valerie could never describe it, not even to herself; it was like an electric shock (but it *wasn't* one) which traveled from the old woman's hand to hers, shooting up Valerie's hand to her wrist and arm, all the way to a flash of white light in her mind. She pulled back involuntarily, dropping the old woman's hand. The great-great-grandmother died that night, peacefully, in her sleep.

Valerie thought it was coincidence until it happened again, twice more, during medical school: once with an old man dying of kidney failure, once with a woman dying of cancer: the same touch, the same spark, the same white light, the same peaceful death in the night. These people had longed for death, sought it desperately, so much so that Valerie had felt it in the deepest, most intense core of their beings: the despair, the brilliant hope. When the people touched her, she became a touchstone, measuring the depth of their yearnings, granting the deathwish if it was powerful enough.

It frightened Valerie. It was far worse than the time, long ago, when she had

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realized that no one else's sense of touch was quite as keen as hers. Should she continue in medicine? Was it right to expose herself to people who might so wish to die? Was it kind and merciful to grant the wish, or was it wrong?

Valerie was not sure. She avoided the question and settled for pediatrics; her power did not work on children, who had not had time to develop enough deepness in their beings to hope, or to despair, that *much*. And Valerie found that her sense of touch was invaluable with the little ones, who so often couldn't tell you what was wrong, or where it hurt.

Valerie was staring blankly at the open journal, almost asleep in her chair, when a commotion in NICU startled her awake. She ran into NICU; a baby had just come in from delivery in *lots* of trouble, and everyone was mobilized, busily suctioning and intubating and setting up the ventilator. When the baby was stable they took time for a full examination, whereupon they found that the baby was anencephalic; it had no brain at all. This case wasn't as readily apparent as most of them were.

"I thought so in the delivery room," said Jill Orin, the baby's pediatrician, "but what if I'd been wrong? What if I let the baby die and it turned out to have been viable?"

After a dismal silence, Valerie said, "You helped deliver Irena too, didn't you, Dr. Orin?"

"Yes," she said. "I almost lost her. *Almost*." Her voice sounded wistful, as if she were speaking of lost opportunities. "What it all boils down to is that we have to make *all* the decisions on medical ethics in a few frantic seconds in the delivery room. You can't make an accurate diagnosis in that amount of time! So we're aggressive; we do everything possible for every baby. And then *this* happens."

Valerie had touched the anencephalic baby during the hasty resuscitation. There was nothing there. Nothing at all. She had never before felt such emptiness.

"What do we do now?" asked the newest nurse.

"We take care of the baby," Jill Orin said. "We keep the baby alive until if and when we can get *all* the family and all the doctors involved to agree to turn off the ventilator and let the baby go." She sighed. "It would have been fine if I had walked here from the delivery room instead of running. Or if I hadn't been able to tube the baby in time. But now that the ventilator's on, we can't turn the damn thing off."

At least, Valerie thought, where there was no brain, there could be no pain.

The last week, Valerie thought as she struggled out of bed Monday morning. This was the very last week of NICU; she had only to survive this week and she would be home free. She stumbled around the apartment in a daze, searching for clothes, hair brush, makeup. When she was dressed and ready and halfway out the open door, she hesitated, looking through the books and notes she was carrying; she didn't seem to have enough—where had she put the rest of her paperwork?

While she was trying to remember, Subway the cat slipped out through the open door and darted across the apartment's lawn. He had never been outside

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before; it frightened him, and he ran still faster when his feet touched unfamiliar grass. Valerie ran after him, calling, but in his panic he ran into the street, straight into the path of an oncoming pickup.

Subway was still alive when Valerie reached him, horribly alive, struggling to rise and spraying blood everywhere. Valerie tried to hold him still; the touch made her cry out in pain. She pushed the feelings aside and shakily stroked Subway while some analytical part of her listed and categorized the injuries: shattered jaw, prolapsed eye, crushed ribs, punctured lungs, broken back, paralysis of the rear quarters. His fluffy tail had been ripped from his body. Valerie knelt in the road, oblivious to passing traffic, and carefully took hold of Subway's paw, praying for something to happen. But it wouldn't, she knew it wouldn't; she had no control over her power, and it didn't work on the little ones, not on children, not on animals, not on anything that didn't know how to wish for death. "Please, don't hurt like this, please die, please," Valerie whispered. But Subway cried and struggled for breath, and nothing happened.

She took Subway to the vet, who examined him and said, "I'll try to save him if you want me to. But he's in excruciating pain, and I don't see any chance for him to live."

"I don't want you to try," Valerie said. "Please don't." She signed the euthanasia form in a mixture of blood and ink, and seconds later the injection was given and it was all over; all the pain was gone, and all the horror.

Valerie drove home slowly, her hands still trembling on the wheel. She stopped the car in the apartment building's parking lot and rested her head against the dashboard. There was blood on the steering wheel, blood on the passenger seat. Valerie was already late for work, but she went to the apartment, found upholstery cleaner and paper towels, and methodically scrubbed the inside of the car before she left for work. While she scrubbed, she cried. For Irena.

That afternoon Valerie attended the final meeting between the doctors and the family of the anencephalic baby; at last, after many tears had been shed, they decided to turn off the ventilator. Valerie made the final notes in the baby's record, and the next time she went to NICU, the baby's incubator was empty. But Valerie felt nothing, not even relief; there had never been any spark of life in the child and nothing had really changed.

Valerie wrote orders for all her patients, and lingered by Irena's incubator. Irena was covered with a pretty hand-quilted blanket, but her red dinosaur was missing. Of course that hardly mattered, since she had never known it was there.

Valerie deliberately put her hand on Irena's and held it there, opening herself to all of the pain. The pain! It could not be borne, it could *not*; no one should have to live through a life made up only of pain, not even a baby. There was no sanctity in such a life.

"Oh, try, Irena," Valerie whispered, clutching the baby's hand. "*Try*. If you knew enough to want anything, you'd want to go." Valerie thought of disconnecting the ventilator, writing an

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order for an overdose, anything—but with a dozen nurses and a bevy of supervisors watching her every move, checking her every order, it would never work.

"How *could* you?"

Valerie spun, startled, and found Judy Jamison standing behind her, waving the stuffed red dinosaur in her face. One of the dinosaur's button eyes was swinging by a piece of thread; it had fallen off, and Judy was in the process of sewing the eye back on to the face.

"What?" Valerie said, confused. There was no way Judy could know what she'd been wishing for Irena.

"I heard what you did to your cat," Judy said. "How could you end his life before his time was up?"

"He was dying," Valerie said. "He was in agony."

"How do you know God didn't have a plan for him? What if God was planning a miracle for your cat?"

"When was the last time you saw a miracle?" Valerie said furiously.

Judy sat down and jabbed her sewing needle at the dinosaur's eye. Valerie turned back to Irena. She had thought she had no tears left, but she found herself crying again, her tears falling on the little quilted blanket. She touched Irena very gently, and suddenly a white light flashed in her mind, traveled *down* her arm to her hand, and crossed to Irena's hand like a spark of electricity.

The next morning Irena's incubator was empty, and Judy Jamison sat in a chair beside it, clutching the mended red dinosaur, and crying. Valerie searched inside herself, wondering if she would feel guilt, but all she found was joy, tinged with one regret: that it had taken so long to happen. ■

FUTURES

(Continued from page 72)

prize—the search for the *Titanic*. The program includes over 75 wrecks to explore, with 100 navigational charts. Discovery of the *Titanic* provides digitized pictures of the sunken vessel.

It's an exciting program, checked by the Woods Hole Oceanographic Institution for accuracy and featuring an introduction by Dr. Robert Ballard, discoverer of the famous luxury liner.

There are two other new simulations that are exciting and demanding to play. *688 Attack Sub* (Electronic Arts, PO Box 7578, San Mateo, CA 94403-7578) is a fast-moving modern game of submarine warfare. The graphics are stunning, with 3D sonar as you hunt the deep ocean water and a realistic depiction of ships on the surface.

Red Storm Rising (Microprose, 180 Lakefront Drive, Hunt Valley, MD 21030) is an adaptation of Tom Clancy's best-selling novel. The book toys with the winnable WWIII, and the game captures the suspense and excitement of an American nuclear attack sub playing cat-and-mouse as the cold war turns hot. *Red Storm Rising* comes with a keyboard overlay that helps you pilot your sub, and, despite a lengthy, well-organized rule book, the game comes with a one-page quick start that can have you underwater in minutes. . . . ■

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Jay Kay Klein's biolog

Many *Analog* authors do extraordinary things without considering them unusual. Amy Bechtel honestly looks puzzled when you tell her you think operating on a 500-pound tiger is something special. "Just routine surgery," she says. Now, the ostrich who had eaten five pounds of screws, nails, shotgun shells, coins, a work glove, and other assorted items—"that's much more interesting." Winning the readers' AnLab poll for Best Short Story of 1988 with her first published story isn't what I'd call an everyday event, either. "The Circus Horse," which appeared in the June issue was, not surprisingly, about a veterinarian.

Amy was raised in Texas, then studied at Texas A&M, followed by a doctorate in veterinary medicine at A&M. Her sister forked off the family tree at a slightly different place and became a pediatrician. Both branches of medicine have a primary concern with "restraint" of the patient, but both types of healers still get bitten and peed on.

Amy wanted to become a writer early on, but thought she'd better learn a paying profession first. Still, getting up at 4:00 A.M. for emergencies, or even having to work all day, then all night, and on into the next day doesn't leave a whole lot of time for writing. As an assistant vet, it was common for her to make a midnight farm call where she first had to catch the cow before operating in the field by the lights of a pickup truck. She's also been a stable hand, a horseback riding teacher, and a hyperbaric technician treating divers in decompression chambers. The worst job was as a secretary, very temporarily.

A writing breakthrough came in 1984 when she attended the famed Clarion workshop, taught by Robin Scott Wilson, Harlan Ellison, A.J. Budrys, Elizabeth Lynn, Damon Knight, and Kate Wilhelm. Amy is still working on the "reading assignments," which included all of Shakespeare, Faulkner, and Hemingway. She had carefully avoided English courses in college since she hated the way literature was taught.

A love for science fiction came by accident at age fourteen, when she found an SF anthology in a motel room. SF conventions came several years later, and she loves them, too, feeling more at home there than at veterinarian conventions. Her diplomas and state licenses are rolled up in the spare room, while the acceptance letters from *Analog* are pinned on a wall.

She now lives some 60 miles north of Los Angeles, not far from Edwards Air Force Base. To do her writing, she takes her three dogs for a walk in the mountains and spends the day sprawled out with a spiral notebook and a pen. She most admires writers who tackle a wide variety of stories and whose prose is so simple and clear as to be transparent.

One benefit of being in California is getting to meet movie stars—like Mike the Dog and the Persian cat from the Fancy Feast commercials. Someone may even bring in a tiger. ■

Amy Bechtel

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Todd Cameron Hamilton

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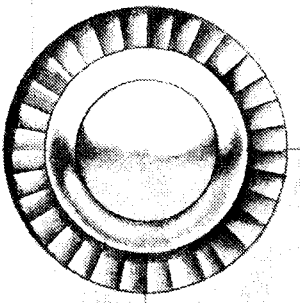
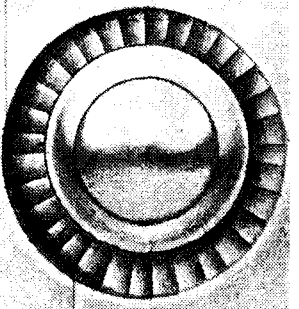
MAVERICK

W. R. Thompson

Sometimes it's helpful to have some madness in one's method!





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Whose fault was it? I don't know, and I was *there*, on Kya, when everything went to hell. Blame anything you like. Blame our isolation and the endless light-years between us and Earth. Blame the kya, who wouldn't let us into the Nomad vault. Blame the Nomads, blame human frailty, blame the UN for sending us Nancy O'Donough.

Life on Kya was hard enough before O'Donough showed up. Loneliness was our biggest problem. It was a month-long trip from Earth to Kya, and living amid a half-billion aliens deepened our sense of isolation. Our fumbling efforts at communication only made things worse. We may have had dictionary definitions for all the words, but every so often we would stumble on some alien concept, some mind-set, and no amount of effort would breach the wall.

The social scientists told me the root of the problem was evolutionary. We humans are descended from tribal apes, while the kya evolved from herd creatures. Intelligence makes both races more than animals, and it gives us a lot in common, but you can find traces of different ancestral behavior in both human and kya. Apparently those differences were more significant than we could have expected.

Lucky me, hammering out communications wasn't my job. I was a biologist, pure and simple, gathering data on kya lifeforms. They were DNA-based, like ours and like the dozen other forms we've found so far. There were differences, of course, which made my job interesting.

I was doing my job the day O'Donough arrived. I had a collection of tissue samples to ship home, and I'd driven to the airport with them—right, airport. The kya didn't have spaceflight, but they did have air travel, and the local airport could accommodate our shuttles. It also handled customs. The kya insisted on knowing what we brought in and sent out, even though they didn't impose duties.

I parked the van and carried my sample boxes into the customs building. It was a small warehouse, and fairly busy; the airport handled a lot of international traffic. I put the cases on a table and opened them.

Inspector Klou came out of his office. He was an old fellow, with patchy white fur, and his age exaggerated both the crouching kya posture and his muzzle-wrinkles. "Hello, Baxter," he said.

"Hello, Klou." That's not a good translation, by the way. The kya *hello* is a loud, deep sniff, a sampling of your scent. They have a terrific sense of smell.

"What do you have here, in approximation?" He took an ampoule from a case and looked at it.

"Frozen plant tissues," I said.

" 'Frozen'?" He juggled the thumb-sized ampoule. "The container being warm, it must have excellent insulation."

"It's a foamed ceramic, made in zero gravity." There was nothing secret about that, but I'd found that a little informational bribe was the best way to get things through customs. No doubt Klou had orders to milk the aliens for whatever data he could get.

Properly bribed, Klou checked my samples against the lists taped to the cases and cleared them all. "I saw your

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ship enter orbit last night," he said. "Will the shuttle come down today?"

"It should be on its way down right now."

"More work," he said. "Many items to check. Steep ground."

"It's rough," I agreed. "At least there's only one passenger this time." I was combining jobs by picking her up.

"The diplomat, yes. I was told that much." Klou sounded aggrieved. I suppose kya aren't any better than humans when it comes to keeping their underlings informed. "Is she a full ambassador?"

"No, she's an attaché, a kind of unofficial ambassador." Does it seem odd that after several years we still didn't have formal diplomatic relations with the kya? It wasn't odd—not to the kya. For whatever reasons they had, they were in no hurry to broaden interspecies contact. Just getting an attaché was a breakthrough.

"Her being unofficial, full protocols are not in order. Less work. Good." Klou signed some forms and gave them to me. "All done."

With the paperwork finished I went out to watch the landing. The shuttle was already visible, a bright glint in the western sky, and it grew swiftly. I listened for the hum of its repulsors, but the engine noise from kya aircraft drowned that out. A team of cargo handlers stood by their equipment as they watched the bird come down.

The shuttle was a big silver gumdrop with legs. It settled onto the landing pad, and after a moment it popped its hatches. While the handlers started offloading the cargo I went to greet the crew and pick up the passenger.

Nancy O'Donough. My first guess was that she'd been spacesick. She staggered as she came down the ramp, and she looked pale and drawn. Her earlength blonde hair was tangled, she wore no makeup, and she must have slept in her coveralls. Beyond that, though, she was a good-looking woman in her mid-thirties.

I introduced myself and took her suitcase. She gave me a weak handshake and a nod, but she didn't say anything as I took her into the customs building. While Klou went through her bag she stood quietly and watched him. I don't think she paid much attention when I extended our base director's apologies for not meeting her in person. Dr. Kittrick usually did that, but lately he had been swamped by his work.

Klou pulled a container of memory cards from her bag. "What are these?" he asked.

"Mem'ry cardz." O'Donough may have had the same language lessons that all newcomers to Kya got, but her pronunciation was off. Slurred, actually. "Filez and programz. Dipl'matic stuff."

Klou's face crinkled. "I can not pass them. I have no way of knowing what they are."

It was time for another bribe. "They're synthetic rubber," I said, "impregnated with iron and cerium oxides, and coated with non-conducting silicates."

"Ah," he said. "Then they contain no toxic matter?"

I shook my head. "No. The silicates are vaporized, and applied at low temperature in a vacuum. As you can see, they are quite solid."

"Ah." Klou put the packet back and closed the suitcase. "Being finished, I

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now welcome you to Kya, Miss O'Donough."

"Nice t' be here," she said. She reached for her baggage, then stopped. "Could you get my things, uh . . ."

"John Baxter," I said.

"Right. Thanks." She followed me out to the van and sagged into a seat. "How far are we from the vault?" she asked.

"It's a twenty minute drive from here. Did you want to see it now?"

"Twenty minutes?" She belched, then shook her head. "Forget it. Just get me to the embassy, OK?"

"OK. Home, James," I told the van. The repulsors started and we slid onto the road. Sick or not, I decided, it was time to set O'Donough straight about a few things. "There's no 'embassy' here," I said. "You'll have an office, but that's it."

"Oh. Right." She yawned, and burped again. "I forgot."

She nettled me. O'Donough sounded —arrogant isn't quite the word, but it'll do. "We're a research base," I said. "There are a bit over two hundred humans here, and most of us are *scientists*. We're not here to do your job."

"Yeah, I know." She looked out a window. We were passing through the business district which abutted the airport. A lot of kya watched us drive past. I'd been here long enough to learn their facial expressions, and I could read their envy. They didn't have repulsors, robot control systems or any of a dozen other things built into our van, but they wanted them. It did no good to tell the kya that we were "only" a century or so ahead of them. A century is as long to them as it is to us.

"I just want to make things clear," I told her. "The base has its priorities. We try to keep good relations with the kya, but we don't worry about diplomatic niceties. Research comes first."

She waved a hand to silence me. "Look, let's talk later. I have a lot to tell everyone, but right now I feel rotten. OK?"

"Whatever you say." I said, and shut up. I'd caught a good whiff of her breath, and that told me O'Donough wasn't sick. Humanity's first envoy to an alien race was drunk.

I didn't see O'Donough for the next four days. Word had it that she was sick in bed, and I was discreet enough not to mention her beer-breath and rotten manners. Besides, my work kept me too busy for much gossiping.

It was springtime, and the air was full of pollen. I had set windtraps and filters atop the base's main building, and every few hours I went onto the roof to collect the samples and replace the filters. I would run the specimens through the analyzers, and by the time I collated all the data it was time to go upstairs for more specimens.

I didn't mind. The main building was only twenty meters high, but that was enough to give a splendid view of the world. By night the city was a sea of neon lights, a high-ticket item you don't see on Earth any more. By day it was just another city, but most of the land around it was untouched, a natural prairie. It was so primordial that they didn't even have sprinklers for the grasses; the vegetation depended on rain alone. The base was in the middle of that prairie, an hour's walk beyond the city's edge.

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And then there was the vault.

The Nomads meant the vaults to be found; they installed neutrino beacons in them, and they left them in accessible spots, burying them just deep enough to protect them from erosion. Why? Nobody knows. The geological evidence says that the vaults are between five and fifty million years old. The Nomads have been wandering through the galaxy at least that long, visiting planets but never settling down, and evidently never explaining anything.

We've been in interstellar space for fifteen years now, since 2017, and we've found five vaults, including the one dug up on Earth. All of them contain hundreds of glass plates, etched with alien symbols. No two plates are alike and no one plate has been deciphered.

We've opened four vaults. The fifth was the Kya vault, a massive quartz cube half-buried in a river bank about five miles from our base. It was easy to see, although at this distance the armed guards and fences around it were invisible, as were the booby traps set to destroy it if we tried something high-handed.

Why wouldn't the kya let us into it? They wouldn't say, but everyone knew the answer. It was a bargaining chip, something they had that we wanted. They hadn't offered any deals yet, but that was only a matter of time. They were trying to figure out what the vault was really worth to us, and what they should buy from us.

I had just put a new set of filters into the traps when Hwuo joined me. "O'Donough wishes to see you," she told me.

Be still my beating heart. "Tell O'Donough I'm busy," I said.

"She was most emphatic."

"I'm even more emphatic."

Hwuo looked at me for a long moment, and I realized I was being unfair to her. Quite a few kya worked for us as "support staff" (translation: cooks, launders, maids), and they shouldn't be dragged into human squabbles. "I'll see her," I said.

"I will tell her." Hwuo left, her splayed feet slapping on the roof.

I left the filters in my lab and walked across the compound to the dormitory. I can't say I liked the place; the design would have been rejected by the Bureau of Prisons as too bleak and inhumane. It looked like what it was, a gray thing synthesized by construction microbots out of dirt, water and air. There was no landscaping; the microbots had done something to the soil that prevented weed growth, leaving it hard and brown. Most of our people spent only six months on Kya, so it didn't matter much to them—but I had been here almost four years.

O'Donough had moved into one of the executive suites, a standard bed-bath-office shoebox. It was a mess, despite the efforts of our native staff. O'Donough herself looked at home in the disorder; she came to the door in a bathrobe and slippers. "Are you feeling better?" I asked her.

"Yeah, and I'm starting work today. You're the first item on the agenda. Can you explain why you gave information to that customs agent?"

"Bribery," I said flatly. When she raised an eyebrow I went on, "It used to be that they'd block about a tenth of

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our imports. Six months ago someone figured out the rules of the game. Now, each time Klou or one of his factors embargoes a thing we try to shake it loose by telling them something about it. Most of the time it works. Why? Is there a law against it now? We *did* have a few regulations about divulging information, but they were vague and toothless."

"No, not yet." She eyed me. "Has anyone noticed a pattern?"

"What do you mean?"

She muttered a curse. "A *pattern*. What sort of materials do they hold up?"

"It's random," I said, "or as near random as our computers can tell. They don't hold up just hi-tech stuff; they've embargoed condiments, uniforms, toiletries, paint—all sorts of junk. And they ask the same type of questions about that as—"

"Hawh. So there *is* a pattern."

"Where—" I saw it. "They're testing to see what's important to us?"

"No, they're doing something else. I can't say what. . . ." O'Donough ran her fingers through her hair, then looked at the wall mirror. "Christ, what a mess," she said, and went into the bathroom.

I watched her rummage through the hygiene cabinet. "Why do you think they're doing it?" I asked.

"If I knew, I'd say." She picked up a depilator. "Did I ever miss *this*. Those mental midgets on the *Resnick* were scared to death of loose hairs in their ventilation system."

"Really?" I asked. "The air filters on most ships can handle hair."

"Someone should have told them that. I *hated* feeling like a slob." With that, she turned the depilator to *High* and started shaving her head. She kept talking as locks of matted blonde hair fell to the floor. "I'm calling a general meeting at eight tonight. Be there, Baxter."

"My work—"

"I've got the authority to do this. Now—" her voice sharpened "—do you always bother a lady when she's in the can?"

I got out.

That evening I had dinner in the main cafeteria with a Russian linguist, and the topic of conversation was a certain diplomat. "She shaved her head," I told Aelita Krupskaya, when she mentioned a rumor she couldn't believe. "I saw her do it."

"What a horrible idea." She shuddered. "I hope that isn't in fashion back home."

"It isn't," a man at our table said. He was Greg Thayer, a Canadian sociologist, and like me he had been gravitating toward Aelita ever since her arrival. "At least it wasn't when I left Earth four months ago. Fashions don't change *that* fast."

"I should hope not," Aelita said. She had beautiful golden locks, a cloud of hair framing her face, and it would have been a sin to sacrifice it to mere fashion.

"That's not all," Thayer said. "She's spent the past four days in bed, watching 3V."

"How would you know?" I asked. By the way, that's a handy way to cut down a rival: ask him how he knows what goes on in a woman's bedroom.

"One of the maids told me," he said. "Can you imagine how O'Donough

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looks to the kya? Anyway—" Thayer lowered his voice to a confiding tone "—you'll never guess what she's been watching."

I yawned. "You're right, I won't."

Thayer looked smug. "Bagdrag. I checked the computer, and it says she's watched all our tapes of it."

"We only have three," Aelita said.

Thayer nodded. "And she's seen each recording over twenty times."

"Bagdrag." Aelita grimaced. "I cannot imagine anything more boring than bagdrag, except perhaps soccer."

"Try baseball," I said. I may be from Oklahoma, but that doesn't make me a national chauvinist. Baseball is boring. So is bagdrag, although it's popular as all hell among the kya. The game involves three teams, a hexagonal field, and an oversized bag of sand. It takes four or five players to move the bag, amid a great deal of shoving and tackling. Don't ask me how points and penalties are assessed. All I can say is that bagdrag is an *appropriate* game for a herd-descended race. The xenologists think it appeals to something deep in the kya psyche, and as a biologist I'll buy that. Bagdrag looks like an atavistic fight over grazing land, with *atavistic* being the key word.

Aelita's thoughts must have run along the same lines as mine. "I imagine that sports would appeal to a certain lower mentality," she said. "But I cannot understand why such a mentality would be sent as an ambassador."

I had to smile. "The UN may have picked her for an ability to empathize with the kya. That could make her seem strange to normal people."

We finished eating and a kya worker cleared away our trays. It was almost eight, and the cafeteria—which doubled as an auditorium—was beginning to fill with people. A couple of dining tables rolled forward and folded themselves into a podium, and after everyone had taken a seat our base director climbed onto the podium.

I don't remember what he said, not exactly. Craig Kittrick usually gave a rousing speech, but his remarks that night seemed disjointed. Changing situation. New direction. Vital importance. Madam O'Donough will expound. Kittrick took a seat amid a smattering of applause.

The applause faded as O'Donough came in. She looked nonchalant as she mounted the podium and faced us, and that made her the only unruffled human on Kya. She had left herself with a high, thin crest of hair down the center of her scalp, and she had added make-up that made her look like Geronimo. Beyond that she was dressed in the pale-blue utility coveralls everyone wore. It made a hell of a contrast.

"First things first," she said, after she adjusted the microphone. "The Security Council has given this base a new directive. We are to gain access to the Nomad vault, and we are to do it with the wholehearted cooperation of the kya. Everything else is secondary to this goal. That includes research.

"Now, this may seem—shut up, gawdamit!" There'd been a low mutter of protest. It chopped off at her shout. "*That's* better. I *was* going to apologize for disrupting your work. On the other hand, you people and your work are *responsible* for our bad relations with the kya. You've made them look like

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cattle, all instinct and no brains. They're insulted, and thanks to you a lot of dumb ass politicians think they *are* herd animals—

"Jesus H. Christ, can't you people keep *quiet?*" She glared at the crowd until she had silence. "*That's* the reason they won't let us into the vault. They think we see them as animals, and we're observing them in their natural habitat. *That* is going to stop. From now on you're going to *cooperate* with them. You'll assume that they know *something* about themselves, and that they're capable of sharing the occasional insight. I also expect you to be more sociable with them, like you're *partners* or something. That's all—*what* is it, Baxter?"

Everyone was mad, and I was near the boiling point. "You're saying *we're* to blame for bad relations with the kya?"

"It has to be *someone's* fault, doesn't it?" she asked. "There are a half-dozen kya observers on Earth, and they're *incredibly* sensitive as to how we view their world. They don't *like* this herd-animal talk, and there's *lots* of it on 3V and best-seller lists and lecture-circuits—"

I boiled over. "You're blaming us for *that?* Come off it! Everyone here does good work. *Careful* work. We are *not* responsible for the sloppy generalizations and hackwork of third-raters who—"

"—who base everything *they* say on what *you* people say," she finished. She looked around the hall. "If your work was so *good*, there wouldn't *be* any room for misunderstanding."

Ahmed Fehmiu had stood up. If O'Donough looked like Geronimo, our senior anthropologist looked like Saladin defying the infidels. "Are you now in command of this base?" he asked, his voice deceptively soft.

O'Donough nodded. "Kittrick is still in charge of daily operations, but I'm authorized to keep you folks from making an even *bigger* mess than you have already. I'll let you know when you're screwing up. I can also order you to do anything I think will help resolve the problem, and I *will*." She glanced at her watch. "That's all I have to say." She left the podium and swept out of the room.

Aelita was the first to speak. "That must be what Grandfather Vladimir meant by 'bourgeois decadence.' "

I nodded. I sat somewhere between bemusement and shock. Look, I *knew* O'Donough was rude, and I'd seen her shaving her head, but her performance had been as overwhelming as an earthquake. "She's up to something," I said.

"Indulging a death wish, perhaps?" Thayer suggested.

"She's trying to shake us up," I said. "She must figure we need it. Damn it, why else would a diplomat act that way?"

Everyone agreed I'd raised a good question. There was a lot of back-and-forth discussion in the hall that night, and by the time it was over we'd decided to send a delegation to O'Donough. Guess who was chosen to head the delegation.

We went the next morning, after breakfast: myself, Fehmiu, and Mei Chao. Officially, Mei was with us because she was a senior administrator. That made a nice cover story. She was

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also a psychologist, and an obscure regulation gave her the authority to net any lunatics and ship them back home.

We met O'Donough in her suite. She was still in her war-paint, and the smell of alcohol floated about her. "Just keep it quiet," she said, when we told her we wanted to talk. "I've got a hangover that would kill all three of you."

"You can scrap the act," I said. "Quit the shock treatment, and tell us what's really going on."

She smiled at me. "You're cute when you're angry, Baxter. Did Kittrick tell you anything?"

"About what?" I asked.

"Good. At least Kittrick has *some* goddamn sense." She went to her desk, dug into the mess atop it, and pulled out some papers. "Read these and sign 'em. Then we'll talk."

Security oaths? We signed them and she collected them. "You three are department heads, so I'd have to tell you this anyway. How many Nomad vaults are there?"

Five that we know of—ah. "Six," I said.

"Good guess. They found a new one last year, on—hell, I forget what they named the place. Some Earth-like world, about fifty light-years from home. It was full of the usual glass plates—only *this* time we know what some of them say."

Fehmiu started with excitement. "The key! How did they decipher—why is this kept secret? The contents—"

"I'll *get* to that. The 'key' was the planet itself. Earth-like, remember? It even had a sapient, humanoid race on it. They had a culture much like Earth's during the late Industrial Age. Social ferment, wars, even some spaceflight. They had a *lot* going for them."

Mei caught something. " 'Had,' " she repeated.

"The Nomads *exterminated* them. The message on one plate *states* that the natives didn't measure up to Nomad standards."

My mouth had gone dry. An atrocity is an atrocity, no matter how ancient. "What are these standards?"

"Beats the hell out of me," O'Donough said. "But *that's* why the UN wants to get into the Kya vault. The cryptologists think that the more raw material they have, the easier it'll be to crack the rest of the Nomad language and learn what makes them so bitchy."

"Quite logical," Fehmiu said, "but why the urgency over a genocide that occurred eons ago?"

O'Donough snorted. "Make that centuries—I *said* this was a new vault, didn't I?"

Give Mei Chao high marks for composure. "You implied it was ancient."

"I did? It's only two, maybe three hundred years old. The Nomads are *back* in this region of space. They're checking up on their vaults. That's one of the things we learned—they make return visits every few megayears, apparently to see how and if any local intelligence has evolved."

"And they know where Earth is," I said. Oddly, I recalled how excited I'd been when some physicists had detected a strange neutrino source in the Ozarks, dug it up—and found an alien artifact. I'd always hoped the aliens would come back in my lifetime.

"That adds a certain interest to the proceedings," O'Donough said. "The

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xenologists figure they could show up any time."

"So," Mei said, "it becomes important to gain access to the kya vault." She ignored O'Donough's silent applause. "What do you propose that we do?"

O'Donough sighed noisily. "If you had paid *any* attention to my speech, you'd know what you're supposed to do. Answer their questions—"

"Including ones that violate regulations?" I asked.

"Don't be a putz, Baxter. And don't repeat what I told you about the vault. In fact, *everything* said here is secret. Remember that."

"We signed the oaths," Fehmiu said.

"I know how you scientists are about secrecy." O'Donough was scowling, as if debating something with herself. "Maybe you can understand *this*, if word about the Nomad slaughter gets out, we'll have panic on Earth. Someone will decide to *take* the vault from the kya. I *hope* you don't think a war is a good idea?"

"Has anyone considered leveling with the kya?" I asked.

She nodded. "They already know we want into the vault. Do you think they'll believe us if we suddenly hand them a story like *this?*"

"They might," I said.

"They probably won't. That's what the UN thinks. They *also* think that our best bet is to show them we're nice, friendly folks. Now *will* you stop wasting my time?"

"Not until you tell me something," I said. "How did you get picked for this job?"

"The same as any other idiot—I volunteered."

"Surely other people 'volunteered,' " Fehmiu said.

"This may not have occurred to you, but I'm *good* at what I do. I have experience and I get *results*."

Fehmiu was unmoved. "This story about the Nomads—how inconvenient that we cannot verify it—"

She bristled. "Call the UN offices in New York and asks for extension twelve-fifty. You'll get verification. Now if you're through insulting me, get *out*."

The three of us got out. "She is sane," Mei said, after the door slammed shut behind us.

Fehmiu snorted. "I'd give long odds against that."

"Let's put it this way," Mei said. "She's eccentric and egocentric, but rational—and intelligent." She looked at me. "I believe you are right, John. She is trying to shake us up. It's crude, but the high-pressure approach can work even when used on people who are aware of the effort. I'd call it an inappropriate technique, but she clearly does not think that."

Fehmiu was smiling. "Perhaps what she thinks does not matter. We are ordered to open up to the kya. There is no reason not to do so. And there is no regulation which prohibits discussing O'Donough, is there?"

"There should be," Mei said. It was obvious what Fehmiu meant by "discussing" O'Donough. "I don't think poor-mouthing her in front of the kya is a good idea. We have to consider the good of the entire human race. If we could make the kya perceive her as a normal, if uncommon, human being—"

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I started laughing. I couldn't help it; I had to lean against the bare corridor wall to stay on my feet. "It's only an idea," Mei said, looking at me. "I still have to work out the bugs."

I gasped, got my breath and nodded. "And good luck to you."

"I'm serious," Mei said. "Someone made a mistake when they sent her here. Imagine how offended the kya will feel when they realize we humans made such a magnificent blunder."

"So we should put a good face on this?" Fehmiu asked.

"As best we can," Mei said. She looked meditative, tranquil, as if she was in a garden shrine, a score of light-years from the minimum-budget, functionoid housing the UN had inflicted on us. "We must find a way to convince the kya that O'Donough is an innocent aberration, before the kya reach their own conclusions."

"Maybe that's what she wants," I mused. "To force us to talk with the kya—explain the human race to them, give details, and make sure they understand us—"

Fehmiu waved a hand. "You give her too much credit, John. If that was her goal, she could do it without her antics."

"Ah," Mei said. "Then her antics are for some other end." She looked pleased with herself, which meant she had an idea. She wouldn't mention it until asked; lately Mei had developed a habit of forcing people to ask for explanations, so she could look brilliant. It was irritating, but on Kya you learned to live with bigger pains. "What is it?" I asked.

"The kya are herd creatures. In a way, so are humans. We are gregarious and conformist."

"Which means what?" Fehmiu asked.

"How do herd beings feel about misfits? Unhappy. Distrustful."

"Which is how we feel about O'Donough," I said.

"Just so. Quite soon the kya will note her behavior. A few of their scientists and diplomats will question people about our response to her antics. They will see that we are very much like them, because O'Donough will force us to act like herd creatures, closing ranks against an internal problem. That may ease the diplomatic tensions."

She was right. So was Fehmiu. So was I. And we were all wrong.

When Wohler discovered aluminum in 1827, a chemistry professor once told me, it cost more per ounce than gold or platinum. The problem was one of production, not scarcity; before the invention of the Hall electrolysis technique the metal could be refined only by a laborious chemical process. This oddity of a rare metal with a commonplace ore led to another oddity. When the truly rich entertained an important guest in the 1830s, said guest dined with expensive aluminum utensils. The lesser lights had to content themselves with forks and knives made of mere silver and platinum.

I mention this to give perspective.

I was in my lab, doing a gene analysis, when I had a visitor: Research-instructor Vse, a biologist from the local university. We worked together at times, but we were hampered by the differences in our background and training. Kya science and technology were so far

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behind ours that she spent much of her time learning things I'd been taught as an undergraduate. It must have galled her to be my student, but she hung in there, soaking up whatever I could teach her.

Vse gave my lab gear an envious look as she sat down. "Do humans digest cellulose?" she asked without preamble.

"Cellulose? No, we don't. Why do you ask?"

"There was a protocol-buffet last night. Were you present?"

"No." I hadn't been invited. The dinner had been a low-key affair, with the guest list restricted to a few kya diplomats, a few of our administrators—and O'Donough. She had been here a bit over two weeks, and the meal was belatedly given to honor her arrival. Biochemistry being what it is, we had supplied our own food, but the kya had served it in style.

Their style. Paper dinnerware was big among the kya, a recently-invented novelty with a faddish popularity, and its use was in keeping with the informal nature of the dinner. Vse was careful to explain this point to me, because she wanted to know why O'Donough ate her napkin.

I almost choked before I could speak. If O'Donough had wanted to shock people—well, I could imagine the look on Kittrick's face. "Perhaps she misidentified it," I said at last. "She is a newcomer to your world."

Vse looked skeptical. "An uncommon error, that."

I had to shrug. "Was there something unusual in the napkin paper? Something to give it a flavor, or scent, that made it smell like food?"

"I wouldn't know, Baxter." She suddenly looked uncomfortable, and I knew she was fibbing. "But may I ask an indelicate question? Is O'Donough male or female?"

"A female," I said. "Why do you ask?"

"I was uncertain. I had thought that follicle loss occurred only among some of your males. What happened to her follicles?"

"She removed them," I said. "Human females like to do unusual things to their hair. The purpose is to make them more attractive to males." Well, usually, I added to myself. There was also something familiar about her Mohican cut, but I couldn't place the memory.

Vse nodded, a gesture she picked up from us humans. "We have our equivalents. This being the case, would you know if any of your males find it attractive?"

"No. A female needs hair to be attractive. But O'Donough is unorthodox."

Vse stood up. "Properly, I should not have asked. Being a scientist, I was intrigued by the biology of the situation."

She left, and I found myself mulling over two separate matters. First off, I felt certain that Vse had done a chemical analysis of the napkins. I *knew* she hadn't been at the buffet—it was a purely diplomatic function—so someone must have asked her to look into the matter. Doctor, our visitor from space has behaved oddly. . . .

Second, the buffet had been two days ago. The base was a small, tight com-

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munity, and rumors moved through it at the speed of light. So why hadn't I heard about the Invasion of the Napkin Eater?

No, I knew the answer. I hadn't been too sociable since O'Donough dropped her little bomb about the Nomads. I knew I wouldn't tell anyone, not because I'd signed some idiot paper but because I was afraid of repercussions. The knowledge that the Nomads were mass murderers would demoralize the entire base—it was demoralizing *me*—and if word leaked back to Earth it would cause a panic. I don't mean riots in the streets; I mean upright politicians and generals deciding that they *had* to capture the vault. That's hell to contemplate.

I'd never known that it could be so easy to keep a secret. The secret had put a wall between me and the rest of the base, making me reluctant to talk, reluctant to risk letting this slip, and god damn O'Donough for telling it to me.

At dinner that night I sat with Mei and Fehmiu. We said little; O'Donough had turned them into brooders as well. The only bright spot to the meal was watching O'Donough; when she came in and sat at a table, people moved away from her. That made me feel good—until I saw Aelita sitting with Thayer on the other side of the hall. She was smiling as if she was dining in an elegant restaurant, and that was something like a last straw. I'd tried talking with her earlier that day, but I'd become tongue-tied when she mentioned the vault in passing.

O'Donough had said to call extension twelve-fifty at the UN. I should have done that before, to verify her Nomad story, but frankly, I'd been afraid to have it proved true. Now—well, suppose it was part of her practical-joke style of diplomacy? I could hope so.

Calling Earth meant getting approval to use the communications center—the FTL radio consumed an enormous amount of power, which made casual calls prohibitively expensive. I went to Kittrick's office and asked him to authorize a call. I had to repeat my request; something was on his mind.

"It's that O'Donough woman." He looked tired as he punched a call clearance into his terminal. "She's making more trouble every day. I don't know, John. I work hard, I try to keep things running, and Earth does this to me. They respond to a crisis by sending us a flake. Why?"

"That's what I want to find out."

He didn't seem to hear me. "Earth is going mad, that's what it is. She comes in here, throws her weight around, tells me how to do my job—" His fist came crashing down on the terminal. "Damn it, this is *my* base!"

I left, went downstairs to the comm center and made my call. Extension twelve-fifty was in the office of the American Ambassador to the UN—his private office. He answered it personally, and I waited while an operator explained who was calling and which code to use for the secure link. Then Phillips's thin, gray face appeared on the screen. "John Baxter, isn't it?"

"Yes, sir. O'Donough said to call you. I want to ask about the Nomads."

He eyed me. "You mean you want to ask about the genocide on Correy III."

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"Yes, sir," I heard myself say. So O'Donough hadn't been lying.

"So be it. The Nomads did something which killed the sentients but didn't touch the lower forms. We think their motive was to cull out a species which didn't meet their intelligence criteria, while leaving the way open for evolution to replace them."

"But you're not sure," I said.

"That's our best guess. One of the messages they left in the local vault declared Correy III off-limits to outsiders. We've evacuated our base. And we've begun a massive search for other vaults, and a new effort to get into the kya vault. I'm talking about it with their ambassador tonight."

"I see." I shook my head, so hard I could have dislocated vertebrae. "No, I don't see. Why did you send O'Donough here? She's a loon."

"Nancy? What's wrong?"

"I'll show you." We couldn't send holograms through the overspace link—the bandwidth and energy requirements were prohibitive—but I could send him a flatshot, one that I found in the computer. "Well?" I asked, as his image studied the picture.

"She takes after her mother."

"Her . . ."

"Maya O'Donough was a singer in a punk band around the turn of the century." So *that* was why her hair style rang a bell. Ancient history. "That was before she had a kid and married a record company executive—her producer, I think. Nowadays they help raise campaign funds and get entertainers to endorse candidates."

"Is that how she got this job? Nepotism?"

His face showed nothing. "She has talent and experience. She did a brilliant job on several difficult assignments. Her record in Albania was especially good."

Albania, the armpit of the Balkans? "Albania?"

Phillips nodded. "She was there for six months, a few years back. She's also worked in Cambodia, South Africa, and North Korea."

I ran a hand over my eyes. Those places were police-states, backwater tyrannies. "Simply phrased, the bush leagues."

Phillips harrumphed. "She did well enough there, and—Dr. Baxter, be honest. Who would you have picked?"

"Someone better," I said bluntly. "You. Or Riasanovsky, or Göteborg."

"In short, a big name," he said. "Some legend with enormous skills and experience. Do you imagine that wasn't our first thought?"

"Wasn't it?" I asked.

"My name was suggested," he said. "And the Russians suggested Riasanovsky, and the Swedes suggested Göteborg, and—well, a lot of names came up. But the Chinese vetoed me because they were afraid that a quick, canny Yank would place American interests ahead of theirs. Mitteleuropa wouldn't let us send Göteborg, because a Swede might think of Sweden over—"

"I get the picture." Everyone had been so obsessed with protecting their interests that they ended up protecting nothing.

"O'Donough was an excellent compromise," Phillips said. "She's junior, but capable, and no one objected to sending her. I'll concede we could have been more reasonable, but things aren't

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as bad as they seem. Remember that you're too close to the situation to have any perspective."

I took comfort from that advice, my doubts dissolving in a sea of reassurance. "What happens if she can't cut it?" I asked.

"You needn't worry about that." He looked down at the flatshot I'd zapped to him, and smiled faintly. "She's imaginative. I don't know what she's doing, but perhaps she *can* clear up the mess you people created. Good day, Doctor." The screen went blank.

I was confused. His glowing words didn't jibe with the woman he'd sent, and I couldn't believe that petty politics would play a role in this matter. Maybe he hadn't told me everything. I hoped he hadn't told me everything.

The next step was to scan the newsnet. I dug up some minor items about Correy III. A discovery notice, the dispatching of a research team, our sudden abandonment of the planet because of a native plague. No mention of a vault or an extinct race, all of which proved nothing either way.

On a hunch I checked the shipping news. I couldn't be sure, but it looked like there'd been an emergency evacuation of Correy III. . . . and deep-space exploration was up, way up. It looked like O'Donough and Phillips had been telling the truth about the Nomads. No ruse, however elaborate, could be this thorough.

By now it was late, and I went back to my quarters. I was halfway to bed when O'Donough called and asked to see me in her suite. Grumbling, I dressed and went upstairs to her suite.

"I visited a kya library today," she said, as soon as the door was closed. "I had a chance to dig through some old magazines. I tore this out of one." She held up a page.

"Looking for a snack?" I asked. God, I sounded polite.

She smiled slightly and tapped a picture amid the print. "Do you recognize this fellow?"

"That looks like Inspector Klou," I said, taking it from her. I read the page. It *was* Klou—Research-instructor Klou. It was hard to make sense of the article—the kya swear by pronouns, multiple conjunctions, and the ablative absolute—but it seemed that the renowned scientist saw no grounds for alarm. Despite certain wild rumors the aliens had not imported plagues, poisons or other weapons to eradicate the kya. He had inspected everything they brought in, and just to be safe he had embargoed anything even vaguely suspicious.

"It's reassuring twaddle," O'Donough said. "The same sort of tripe *we* put out in a crisis. Don't panic, we're on top of things, and so on."

"So you were right about the customs inspection," I mused. "All those questions are just a ruse, to keep us from noticing their *real* intentions. And —Vse."

"The biologist? What about her?"

"She's busy learning everything I can teach her, and she's curious about everything in my lab. If they're scared of biowar, well, maybe she's trying to learn if we're plotting that. But *why* would they suspect that?" I waved a hand in disgust. "No, I know. Public opinion, ignorance, rumor—and then the government has to calm the panic.

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But why hasn't someone just come straight out and asked us?"

"I can't answer that yet," she said. "But here's another thing. How do you feel about sports?"

" 'Sports'?" That was an odd change of subject, even for her. "Aside from women's gymnastics, it bores me. Why?"

"Typical university intellectual." She grinned. "The first day I was here I watched some bagdrag. When I asked one of the kya staff about it, he said that he didn't like it. So I watched some more, and I got some other staffers into my room, and they all said much the same thing. Bagdrag was stupid, pointless, and so on. That's an odd way for working-class folks to feel about a popular sport—"

My jaw dropped. "They're spies."

"No, they're university researchers doing field work. They're studying the aliens and getting a look at our daily lives."

My head was spinning, ever so slightly. I'd come here in sweet anticipation of further unpleasantries, and here she was acting like a rational woman. "Why are you telling me this?" I asked.

"Because you just passed my intelligence test. You—why don't we sit down while I explain?" I took a chair while she reclined on her bed. "You called the UN and asked some questions. Then you did some digging and tried to verify the story."

"You tapped my call?" I asked. Maybe I should have felt outraged, but by then I was too bewildered.

"And your computer work. I needed to know how much you had figured out. You see, I need help, and you just proved you're smart and flexible enough for the job. Fehmiu and Chao—I had hopes for them, but they dropped the matter without even calling Ambassador Phillips."

" 'Help,' " I said. "What do you want?"

"An idea man, someone who can help me think things out. An extra observer. Someone who isn't fooled by my act. You're my only candidate."

I'd felt this way once before in my life, when I'd been drafted. "What have you got in mind?" I asked.

"Finding out what the kya have in mind. The UN offered them a blank check for the vault, but they turned us down. Why? They've been studying this base, but what are they trying to learn?"

"That's like asking why you've been such a pain," I said.

"Fair enough," she said. The bed creaked as she raised herself on an elbow. "Look. Our relations with the kya were fine at first. We had even started talks to get into the vault. Then we put the base here. We didn't expect any trouble, because it was part of an agreement we had—they were going to have a base on Earth to match it. But things changed soon after we opened the base. They stopped negotiating and they canceled their own plans for an Earth base. The situation keeps sliding downhill."

"And the UN blames everyone here," I said, "so you decided to use shock treatment and blast us out of our ruts."

"I was told to fix things, but no one said how." She touched her scalp again and smiled. "Mom once told me that anger and outrage will get more done than a sweet smile. She was right. Peo-

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ple here are pissed off at me, and they're straining to counter the harm I'm 'obviously' doing—mainly to spite me."

"You called *that* right," I said.

She looked untroubled by that. "It's getting results—that buffet they gave for me is one sign. They arranged it only one day in advance. You'll recall they ignored my arrival?"

"So they're thawing," I said. OK, she *was* getting results. And yet—"You *could* have been open with us. Why weren't you?"

"Because from what I heard back home, I'd say you're all being set up as scapegoats—as I said, failure is always somebody's fault. I couldn't let anyone know that, not without demoralizing the place. I decided it was better for everyone if you thought you were in the hands of a maniac. Luckily I got off on the wrong foot when I got here, which helped."

"You were drunk—" My certainty wavered. "Weren't you?"

She nodded, making her hair-crest bobble like grass in the wind. "I got spacesick when the *Judy Resnick* came out of overdrive, so Captain Armitage gave me his sovereign cure." She grimaced. "Raw eggs and whiskey, mixed in a liter of dark beer. By the time I landed I was ready to pass out."

"You made a hell of an impression," I said. "And—"

There was a knock at her door, and one of the staff looked in. "For trash," Kadeh said, coming in with his cleaning cart.

O'Donough lay back on her bed. "You're working late, Kadeh."

"Delays of schedule." Kadeh puttered about the suite, emptying wastebaskets. I stayed in my chair and wondered what sort of mental notes he was making.

O'Donough eyed me in amusement while Kadeh worked. "Being observed makes you uncomfortable," she said after he left.

"I don't like it," I conceded.

"Nobody does, but you get used to it," she said. "Albania was much worse than this—bugs everywhere, secret police, informers, provocateurs, everything. At least the kya aren't trying to entrap us as counter-revolutionaries."

We talked for a while. The way to cope with life under a magnifying glass, she told me, was to turn it into a game. Watch the watchers, compare their techniques, give them points for cleverness—things like that. "And there's a point to the game," she said. "Find out what they're trying to learn. Note the sort of questions they ask. That may tell us why they're unhappy with us."

"And what to do about it." It was time to leave. I went to the door, paused, and looked back at her. "Why do I get the feeling you're up to something else?"

"That's because you're as smart as I think you are." O'Donough lay back on the bed and pillowed her head on her arms. "And because I'm *always* up to something else."

Fair warning.

I did little research in the next few weeks. There wasn't enough time for it. Instead I kept my eyes and ears open, did some thinking, compared notes with Fehmiu and Mei, and talked with O'Donough once every few days. That ate up several hours in my evenings,

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although I couldn't complain. When she put her mind to it Nancy O'Donough could be a charming, entertaining hostess.

Maybe it shouldn't have surprised me that I enjoyed her company. A good diplomat, even one as skewed as O'Donough, must have a great deal of social skill—and the base was about as *thrilling as Tulsa on a Wednesday afternoon*. Don't tell me about the excitement of scientific research on an alien planet; everybody needs a break, and the few "entertainments" in our two rec rooms didn't make the grade. Neither did seeing the sights in the local city and countryside, not after the first few excursions among not-too-friendly aliens.

We're spoiled on Earth. When we want to fill our time, we can go to cinemas, concerts, restaurants, shopping malls, vacation spots, you name it. A hole like Kya forces us to fall back onto our personal resources, and for most of us it's a long, hard fall. O'Donough may have been the first human on Kya who was used to such conditions. That was quite an asset.

(Let me pause long enough to put this on the record: at no time did we become paramours. Friendly enemies, yes, perhaps even conspirators, but not lovers. Even if I hadn't been so enamored with Aelita, even if I hadn't thought that Mohican cut was plain hideous, I was too chary of O'Donough for any romantic feelings to spring up.)

She wanted me to report on what I saw and heard and thought, which kept me busy. O'Donough kept things stirred up; every so often I would see her walking from one debacle to another, her hair-crest cutting the air like a shark's fin in the ocean. To add to the mess, people somehow learned about the things Ambassador Phillips had told me about her. Then Kittrick told me that, in addition to disrupting his administrative work, O'Donough had made sexual advances to several men and women. She was becoming less welcome than a flea at a dog show.

I also saw a lot of Vse in that time. She was showing a new interest in comparative physiology, especially in regard to reproductive cycles. The differences weren't all that great, once you got past the fact that kya females were fertile on a yearly rather than a monthly basis. We stuck to the basics at first, but the day came when the emotional aspects began peeking around the corners at us—as, I'm sure, Vse and her supervisors planned.

She didn't learn much about human passions from me, because I was in no mood to discuss the matter. Things were going badly with Aelita. I'd tried talking with her the night before, and she had brushed me off—not firmly, not heatedly, but effectively. And when someone will not speak with you, you by definition cannot learn why she isn't talking.

Vse and I had spent most of the day doing hormone analyses, using my lab equipment and her blood samples. At day's end she went home, excited by some new discoveries, while I went to my quarters and cleaned up before dinner.

Lately I'd made a habit of sitting with different people at dinner and trying to strike up conversations. I never drew anyone into a deep, meaningful talk, but

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I did learn how O'Donough continued to make herself unpopular. People seemed to take a perverse delight in telling me about her latest outrages, almost as if I could do something to stop them.

Tonight I was with a pair of French botanists. O'Donough had suggested —well, ordered—that they spend less time in their lab and more time in the native libraries, researching kya scientific literature. "One understands her reasoning," Pierre Mitrailleuse said. "The kya are acquainted with the cruder aspects of their flora. We may learn a few things. Yet need she be so abrupt?"

"She's under a lot of pressure from the UN," I said.

"Yes, the UN." His partner spoke with the offhand scorn which the French feel for everything non-French. Anton Chassepot took a sip of his coffee, then showed me a moment of proper Gallic disdain. "Such a pity that her pressure finds no adequate relief."

And what did *that* mean? I didn't ask. I had just seen Aelita enter the cafeteria, so I excused myself and went to join her. She looked pleased about something, and Thayer wasn't with her—what better time to make time?

It turned out there were better times. By the time I caught up with her Aelita had taken a seat with several other people, and she was already describing her day. She had turned some of her linguistic recorders into spy gear, allowing her to eavesdrop on kya conversations as she wandered around the city. "And I have already identified several new terms," she told the table. "Judging by context, they're slang, and possibly obscene." She gronked out a few kya words.

"What do they mean?" someone asked her.

"I'm not certain," she said, "but they have something to do with social interactions. Unpleasant ones, I'd say. I wish I had more context and fewer pronouns."

"You'll get them," I said.

Aelita shrugged. "Perhaps. I have one word—" a quick, ugly gurgle "—which I *know* refers to a certain type of person. An—oh, damn, it doesn't translate well into English, but it means someone whose behavior is contrary to accepted norms, an atypical member of a herd."

"A maverick," I said. That drew odd looks—I was the only American at the table—so I went on, "It's a cowboy term. It means a head of cattle that doesn't belong in a herd. It can also mean a hard-core, industrial-strength nonconformist."

"The very word. I overheard two of our staff use it to describe O'Donough." There was laughter, long and loud, and that was the last thing Aelita said to me at dinner.

But not that night. I followed her out of the cafeteria and cornered her in a hallway. "What's wrong?" I asked.

" 'Wrong'? What do you mean?"

"The temperature's been dropping the past few weeks, Aelita. I thought we had something between us."

"We did," she said, "more or less. It's less, now. I thought you'd lost interest in me."

"Like hell I have!"

"Then why do you spend so much time with O'Donough?" Jealous? No. She looked more puzzled than upset.

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"If you were interested in me, wouldn't I see more of you than she does?"

"I—" What in hell could I *say?* "Aelita, believe me, I am not interested in O'Donough. I—"

She sniffed. "You're going to see her tonight."

"What makes you think *that?*"

"You're freshly-shaved and wearing cologne. That only happens when you visit her."

"But—"

"This is a small base, John. Everyone's noticed you two lovebirds."

Well, that explained Chassepot's comment, along with a few other things I'd heard. While I stood there looking like a fool Aelita slipped past me, and just to prove her wrong, damn it, I did *not* go to see O'Donough that night.

Which I had planned to do.

I found Fehmiu and Mei in the base library, listening to a popular kya song. It was too alien for human enjoyment, even when you took into account the esoteric joy of learning. They both seemed happy for a chance to shut off the noise. "There's trouble, isn't there?" Fehmiu asked.

"Yeah, there's trouble." I dropped into a seat. "What's O'Donough *done* to us?"

"She's certainly made life harder—" Mei began.

"Harder!" I started telling them about Aelita. I hadn't planned on saying anything, but these two people were the only friends I had left on Kya. Like me, they'd become isolated by the burden O'Donough had placed on them. At times it felt like the three of us against the Universe.

"Take it easy," Fehmiu said. "John, you need a sense of proportion. You weren't all that close to this woman in the first place, and—"

"Hell's bells, I was *trying!*"

"Not as hard as you're taking this." I got up; he got up, put a hand on my shoulder and pushed me back into my chair. "We all strike out at times. Tell me, have you ever before been this upset over a woman?"

"This is *different*," I insisted.

"Only because you are here. This—" his arm waved to take in the base "—is a small world. Trivial things become important, great things lose their significance. It's as if we lack a frame of reference here."

I said something foul, and unimaginative. "I've never been in love like this. It's got nothing to do with being here."

"You're not in love with this Aelita," Mei said. "She's quite pretty, granted, and charming, but she's not your type. Your fascination with O'Donough is more understandable. It's not odd for a man to feel attracted to the exotic—"

"I'm not attracted to her, and don't give me that 'opposites attract' drivel. Don't you think I know what's going on in my own head?"

That, in case you didn't know, is not something you say to a psychologist.

Vse showed up early the next day, bearing blood and tissue samples to run through my lab apparatus. Not long after the data started rolling in I got a message from O'Donough, brought by one of our staff. "She wishes to see you," Sryf said.

"It can wait," I said.

"She says it is urgent."

"Tell her to use the phone." I turned

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my back on Sryf and he left. The phone hummed a bit later, and kept humming; I ignored it.

O'Donough showed up after a while. I would have ignored her, but I was conscious of Vse observing us. "We can talk here," I told O'Donough when she entered my lab.

"I'd rather see you in my office," she said. "Or in your quarters."

"Forget it."

"Let's put it this way: *you* want to see me in your quarters."

Don't ask me why I listened to her. I took her to my place, which no doubt amused the whole base. "Dr. Chao wants to send you home," she said, as soon as I'd shut the door behind us.

"What for?" I demanded.

"Basically, she thinks you've been here too long—"

"And I'm cracking under the strain."

"You *are* under a strain—"

"Damn straight." I was glaring at her. "And three guesses as to who's behind it."

Her face and scalp reddened, an all-over blush, but she didn't answer that. Instead she said, "I deleted her request form. You're staying here. Mei Chao thinks you need therapy, but I think you just need a few days' rest."

"Well, she's the doctor, and if she thinks I'm nuts—"

"Oh, shut up," she said irritably. "I've seen people act like you. They spend too much time in a hard-duty post like Albania or North Korea, and they don't realize they need to let off steam. Once they do they feel and act a whole lot better. The alternative is to ship you back to Earth for therapy and observation. I can't have that. I need you here."

"As your spy."

"Yes."

My bed creaked as I sat down on it. I didn't doubt that "therapy and observation" would mean a nice, long stay in the Home for Befuddled Biologists. How long? Oh, just until the current crisis was over and it became safe for me to mention Correy III and genocidal Nomads. Which might be never.

"All right," I said. I realized I was rubbing the back of my neck. I stopped it and looked up at O'Donough. I didn't like that look on her face. "You're not telling me everything."

"If I'm not, are you sure you'd want to know? You only make trouble for yourself when you ask me questions."

"So I'm too stupid to learn from my mistakes. Talk."

"OK. There's a ship coming in from Earth. The Krupskaya woman is leaving on it tomorrow morning."

"Aelita? But—" I *was* befuddled. "Her term isn't up."

"She's decided she has all the data she needs. So she says. She'll also be on the *Willy Ley* with Greg Thayer—"

I groaned.

"—her fiancé. He proposed to her last week, and I don't think you should share the same ship with them." O'Donough shut up, and she had the decency to let me tell her to get the hell out of my sight.

I spent the rest of the day in my room, skipped dinner, spent a restless night, skipped breakfast. Sleep? Eat? Not when I needed to think of some way to bring Aelita to her senses. I had to be brilliant, and—trust me on this—I was. I suddenly knew what I had to do.

It was late in the morning when I went

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to my lab, packed an assortment of samples and took off for the airport. I punched the robodriver's *emergency* button, and hung on while it blasted through the traffic. It would take Klou a while to process my samples, and while he did I would have an excuse to look up Aelita and reason with her.

Klou was checking the paperwork on some crates when I hustled into the customs building. "These have to go out on the shuttle," I said, dumping my sample case onto a table. "Is it down yet?"

"Down, then up, not long after dawn." He was watching me. "You are troubled, Baxter."

I swore—in English, of course—then switched back to kya. "Did Aelita Krupskaya leave on the shuttle?"

"A moment to check, the list being in my office." He hesitated, then added, "You could accompany."

I accompanied. His office was a dank cubbyhole, filled with dusty filing cabinets. He began digging through them. "There is trouble with Krupskaya?"

"I wanted only—trouble thus—even didn't she *tell* me—" I was so upset I could barely speak English, much less kya. Aelita had snuck out of town, I'd had to hear from goddamned O'Donough that she was getting married, I'd missed my last chance to see her, and here was Research-instructor Klou, *alias* Inspector Klou, studying the male of the alien species.

"Krupskaya went up," he said at last. Then he sat down behind his desk, removed a porcelain jar and matching glasses from a drawer, and filled them. "Pure ethyl alcohol and distilled water, no other additions. Is such human-compatible?"

"Very." I knew damned well what he was doing. I also knew what I was doing. I took the glass, drank it, wheezed something about rocket fuel, and held out the glass for more. It was vodka, raw alcohol, and I told Klou that such was the favorite drink of the Russians. Aelita's people.

I'm not sure what else I told him, at least not in any detail or order. Between us we killed the bottle, and I think I told him that I loved Aelita Krupskaya, that she was about to marry an idiot who'd make her life miserable, that that maverick O'Donough was wrecking my life and had caused me to miss Aelita's departure, and I was sick and tired of life, the base, and everything else.

Klou, bless his devious soul, had a second bottle in his desk. How long had he been waiting for the chance to get a human in this position? Years, of course—but he blew his chance. We made some toasts, to females, to romance, to passion, and then I passed out before he could get into some serious questioning.

Too bad. I'd really wanted to tell him everything I knew about O'Donough. Blowing her secrets and her plans would have been fun.

I woke up in bed. I was in such awful shape that I needed several minutes of thought and observation—pounding head, creaking joints, taste of death in my mouth—to realize that I was hung over. My one consolation was that I couldn't feel any worse.

"It's about time you came to." O'Donough's voice, and there went my

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consolation. I struggled to sit up and found myself in bed. Her bed.

"Your car brought you back yesterday afternoon, John." She pushed a glass into my hands and I drank. "Kittrick and Fehmiu carried you up here. You've been unconscious ever since. How do you feel?"

"Gagh." But the hangover was ebbing. So fast? "What did I just drink?"

She took the glass from me. "A State Department drinking remedy. It has its uses. Do you remember much about yesterday?"

"Aelita went home. I missed her shuttle. Damn it, why didn't you *tell* me—" I shook my head, which didn't quite fall off my neck. Then I remembered my brilliant plan to win Aelita's love. Lord, was I really going to threaten to commit suicide? "I made an ass out of myself, didn't I?"

"Let's just say you're the talk of the town. On the bright side, you've convinced some people that we're not lovers, which ought to restore your reputation as a normal man."

"Uh?" Had I said something while I was drunk? But she didn't sound hurt.

"You've been tagged as 'the maverick's boyfriend.' I can guess how you feel about that. This is a small community, and social pressures build up high."

She perched herself on the edge of her desk. "How do you know you're being called a 'maverick'?" I asked. I hadn't mentioned that to her.

She put a hand on her phone. "Remember the software I brought from Earth? One of the programs lets me turn a phone or intercom network into an eavesdropping system. A sorting program lets me sift out data."

"Oh." My brain was getting back on-line. "Then you don't need me to do your dirty work."

O'Donough rolled her eyes. "What you're doing isn't dirty work. I need your viewpoint. But if you've had enough, you can go home on the next ship. I won't stop you."

I shook my head again, which didn't quite fall off. "I'll stay."

"Good." She didn't smile. "I had a message from Earth last week. If we can't get into the vault in another two or three months, the UN will send a peace-keeping force to take the thing. We'll butcher a lot of kya in the process—and if you want my guess, we'll flunk the Nomads's intelligence test."

"By stomping someone the way they did?"

"Most criminals are hypocrites. And if you want another guess, I think we'll need the kya as allies to fight the Nomads. That's why I'm glad you're staying. I'm using you to help repair our relations with the kya."

"That's not why I'm staying." I sat up. The Universe wobbled a bit, then stabilized around me. "I don't give a rat's ass about the kya, or the Nomads, or Earth's mortal peril. I'm staying so I can find out what's going on under that idiot haircut of yours."

She gave me a mocking salute with the empty glass. "I'll drink to that."

I'm a bright guy, and I had all the facts. Given enough time, I *know* I would have figured it all out. Maybe that's why the mutiny got me so pissed

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off. It ruined my chance to show O'Donough that I could out-think her.

I had spent most of the day in the field. Literally. I'd always wanted to study a certain rare local creature, a metatherian which paralleled the Earthly wombat. One of my biodrones reported traces of the beast, and there was nothing for me to do but take a car and go on a safari.

I didn't give up until late afternoon, after hours spent tramping the woods a hundred klicks south of the base. The car brought me home in time for dinner, and that's when I first noticed something odd. There was a change in the air, a combination of moods among the diners which I didn't like. A studied nonchalance, an overdone calmness, and people were watching me. They weren't even trying to hide it.

It was something to discuss with O'Donough. I hadn't seen her since my drunk over a week ago, so it was time for a visit—although I didn't stop to shower, shave and otherwise preen for the occasion, thereby refuting the Mei Chao Attraction Theorem.

Two men were standing outside O'Donough's door. And I thought I was her only admirer. "What's up?" I asked.

They grinned at me. "House arrest," one of them said. I knew them only in passing—a couple of junior researchers from the geology department. Whatever they were doing, they took it seriously. They both wore white armbands, evidently cut from handkerchiefs. "Dr. Kittrick says the maverick stays locked up until he can ship her back to Earth."

"And you can't see her," the other added.

"Did Kittrick order that?" I asked.

"You can't see her," he repeated. "Dr. Kittrick doesn't want *any* trouble."

"Get out of my way and there won't be any trouble." They were both in their early twenties, say a dozen or so years younger than me. No doubt they could have taken me, but they must have decided it wasn't worth the risk—I'm no lightweight. They stepped aside . . . but the looks on their faces were deadly.

O'Donough was on her bed, a quirky smile on her face and headphones on her ears. "Wagner," she said, seeing me come in. She sat up and adjusted her bathrobe. "*Die Götterdämmerung*. Music to be overthrown by. How goes the revolution?"

"Is that what's going on? Fill me in, O'Donough."

"There's not much to say." The headphones came off and she smoothed her crest of hair. "This afternoon someone deactivated my computer terminal and phone. I've been held incommunicado ever since. Kittrick was here a while ago, making noises about house arrest and independence from Earth. Where have you been?"

"On a wild goose chase."

"There are no geese on Kya."

How could she be so calm? But I realized one thing. "Someone fed bogus data into one of my drones and sent me out into the boondocks. They—Kittrick, I guess—wanted me out of the way."

She laughed mirthlessly. "Most rebels aren't that considerate."

"No kidding. What—look, you're going to need help. Is there anything I can do?"

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"Yes, there is. Kittrick will have to deal with the kya. When he does, I want you with him. Insist that we get a new base—"

"Huh?"

"A new base," she repeated. "Get us into some kya buildings. Something livable. John, our real problem is this base."

Had she flipped? "The real problem is this mutiny. Kittrick's in revolt, you're being held hostage—"

"Only because it suits my purposes." She showed me an odd look, one I'd never seen on her face before. "Jeez, you're really worried about me, aren't you?"

"You're in danger, O'Donough. Those guards out there—" I remembered the looks on their faces, and I shivered. They were nice, civilized guys, and they *hated*. And Kittrick had declared independence? That was mad. What was happening to people here? "I'm scared. Anything could happen."

"Don't worry about me, John. I'm through provoking trouble. But if I have to—" She bounced off the bed, made three quick moves, kick-whirl-jab, and a hard plastic chair snapped into fragments. "I can take care of myself."

"What if you have to hold off a whole fucking mob?" I didn't feel even a little paranoid as I said that.

"I can." She reached into her robe and pulled out a revolver. It was a .44 magnum, the same sidearm carried by Army officers. It looks like a hand-held mortar and it will deter anyone with an abiding interest in continued breathing. A laser lacks that psychological authority—and despite what the arms makers claim, lasers break down too often to make reliable weapons. "Klou missed this. That's what first told me he wasn't a genuine customs agent, by the way. He couldn't find a simple hidden compartment in my bag."

"I see." I shook my head while she put the weapon away. "Did you come here expecting trouble?"

"Let's say I had a hunch." She slid the broken chair under her bed. "But I've been stupid. I didn't expect this revolt."

I sat down on the remaining chair. "What *did* you expect?"

She sighed. "Just a very bad situation. People have returned from Kya suffering from anxiety, depression, mild paranoia, lethargy—the sort of things you find in diplomats who've spent too long in a stressful, hazardous-duty embassy."

"Such as Albania?" My God, I thought, maybe her presence *did* make sense.

"Or North Korea," she said. "Or isolated polar stations—I did my doctoral dissertation on stress and isolation problems. Everyone figured that the kya were pressuring people here. But then I got here and saw the base. This place is *sick*, John, and it's making everyone here sick. When I thought about how it must look to the kya—"

I smacked palm to forehead. I felt no sense of revelation, no great *Ah hah*, only disgust. What did the kya see here? A dead place, a necropolis unfit for habitation. So why did the humans live in it? They must be insane, or alien beyond comprehension . . . or perhaps they were trying to hide something about themselves, blanking out major parts of their social structure. "So that's why the kya

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are watching us," I said. "They're confused. Frightened."

"I'd say they're terrified." She began pacing back and forth on the linoleum floor, and for the first time I realized she was worried. But that pacing was the only sign she gave of it. "Living here, we come across as monsters. No family lives, no comforts, no arts, just a paramilitary lifestyle. We have sex and hedonism, but little love or passion, nothing to mark us as humans. As the kya see it, either we're hiding something about ourselves—or we're soulless creatures who enjoy this."

"Is that why they won't let us into the vault?" I wondered.

"That's my guess. They're afraid that once we have it, we won't need them around any more. We're technologically superior, and they know something of our history—slavery, Indian wars, pogroms—so they have reason to be scared." She was scowling. "Their power to keep the vault from us, to destroy it, gives them their only sense of security. The stalemate will last as long as they're afraid."

"And it's all because the government wouldn't pony up the money for a decent base."

"Right. The UN has ignored my reports. Fixing the situation would cost money—plus the political embarrassment of certain people admitting they screwed up."

"Idiots." It was plain, stupid economizing. Why give a bunch of scientists a cushy home-away-from-home? They didn't need it. "It never dawned on anyone that the kya might measure us by what they saw here."

" 'Fraid so. And that's the reason for my act. I had to help the kya get the right measure. I wanted to drive home the point that we don't normally live like this, that our psychologies are similar to theirs. That meant showing that life here was tearing us apart."

"So you applied pressure," I said.

"Yeah." She went to the window and stared at the empty prairie. "Diplomats are trained to know how to soothe people, how to keep trouble from cropping up. Turn it around, and we know the best ways to upset people. A weird haircut, a bad attitude, the right insults and wrong suggestions—lunacy like eating a napkin at a diplomatic function—"

"Which must have made the kya think . . ." My voice trailed off. Make them think. Right. I nodded. "Right. The kya think we're efficient, calculating monsters. But there's no way they can reconcile that with your behavior, is there?"

"I hope not," she said. "I've tried to make myself look like an incompetent political appointee, somebody who wouldn't have been sent *if* we're as ruthlessly efficient as they think we are."

"You laid it on pretty thick," I said. I waved a hand before she could say anything. "But they don't have a lot of information about us. They might have missed anything subtle."

O'Donough's laugh was a wry sound. "Too bad they couldn't have seen the infighting at the UN before they picked me. It would have saved us all this trouble."

"And kept things from falling apart here," I suggested.

"What? No. The strains were already here. All I did was to make them as obvious as possible. I didn't plan to start

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a revolt. What I *wanted*—" She looked chagrined. "The day after I got here, Kittrick paid me a courtesy call. I tried to discuss the situation and the need for a new base, but he didn't care what a mere junior diplomat had to say. He told me to shut up and not interfere with his work."

"That's Craig." I thought back to Kittrick's arrival two years ago. "But he wasn't always like that."

O'Donough nodded at her reflection in the window. "The strain was already telling. I couldn't get his help, so I had to improvise—if he'd been cooperative I might have been able to avoid this act. Instead he's retaliated by creating rumors that I'm a spoiled, illegitimate, bisexual sociopath."

"Laying the ground for this coup."

"Yeah." She sighed. "I misjudged him and the situation—"

The door opened and Craig Kittrick came in, accompanied by two more of his jiffy-made guards. They wore the same armbands as the other men. "Baxter, get out. She isn't to have visitors. Orders."

"You didn't give any such orders—"

"So what? I'm giving them now. Move."

I hesitated. Kittrick seemed so damnably *normal*. No mad glint in his eyes, no foam flecking his mouth. Only his attitude was crazy.

O'Donough spoke. Her tone was so mild it startled me. "John, please don't make any trouble." She sat down and put the headphones back on her head.

I left, and then I was *really* scared. People I knew, respected and worked with, were giving orders and wearing armbands. As we left the room the two guards came to parade-rest, while the other two men trailed Kittrick and me down the corridor. "What's with the police?" I asked.

"The maverick is a menace," he said casually. "We can't take any chances with her. From now on there are always two men outside her door."

And what about the guards with us? I wondered. We saw people in the corridors, and they looked at Kittrick as if he was a conquering hero. "So what happens next?"

"I try to clean up the mess she made. Negotiate with the kya, establish my authority, get our research back on track—but first I need to decide what to do with you." We went into his quarters, and the guards pointedly accompanied us. They stood behind me while Kittrick sat behind his desk and regarded me. "I'm not sure about you. You went crazy over Krupskaya, but you've been plunking the maverick, too. So you could be dangerous. What gives?"

I sighed. "I've been here a long time . . . and O'Donough's sure as hell *different*. I—well—" I shrugged. "You know."

He snickered. "We're both men, right? And it's hard to turn it down when the bimbo chases after you. Especially when she's a bit kinky."

"I guess so." I felt like a heel, but I was plain, cold-sweat *scared*, and I was afraid to say anything that would make Kittrick turn on me. Toady up to him? Make vulgar talk about O'Donough? Anything to save my neck, and it wasn't as if I was betraying her, after all. I'm great at rationalizing survival. "You'd have to ask Dr. Chao."

"I already have. She says what you

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felt for the maverick was an understandable aberration. I'm inclined to agree. I think I can trust you to keep your nose clean from now on." Quite calm, quite sensible, quite intimidating. "Now, I need to know—" His intercom sounded. "This is Kittrick."

"Sir, it's ten after seven. Everyone is waiting to hear you." The voice sounded excited.

"I'm on my way." Kittrick got up and walked around his desk. He clapped me on the shoulder and smiled broadly. "I need all the good men I can get, Jack. I'm glad you're one of us."

There was a rally in the auditorium. Everyone except O'Donough and her guards were there. Kittrick walked up to the podium, amid waving fists and raucous screams—how can a mere two hundred people make so much racket? Kittrick stood up there while the lights dimmed and a spotlight focused on him. He waited until the noise started to run down, and then he gestured for silence.

His speech was electrifying, I'll give him that. We were on Kya for the good of humanity. The UN had blundered and erected obstacles. Those with no qualifications had made decisions and given orders. That betrayal of the human future was at an end. Affairs would now be handled by the competent, the informed, the rational. A new day had dawned. All hail the future!

Everyone roared and applauded, and with one of the new police standing next to me I did the same thing. I wondered if I was the only one who thought Kittrick had cracked, and I wondered how many other people were too scared to speak out. I wondered, but I shouted myself hoarse in his praise. I saw Fehmiu and Chao outdoing me, and when the rally was over I went back to my quarters and shook like a leaf.

I was too frightened to think. Everything Kittrick had said appealed to me . . . . even though I knew the speech was a travesty, and wrong. I was scared for my own hide, yes, but also for my sanity.

One irony occurred to me. If I retained any shred of normality, it was thanks to my association with O'Donough.

I slept, don't ask me how, and was rousted out of bed by a guard. He took me to Kittrick's suite, where a breakfast tray waited for me. Kittrick himself was already eating. "You've been here longer than anyone else. I'll need your advice before I talk to their government today."

" 'Today'?" I took a chair, balanced my tray on my lap and made myself eat. It wasn't easy; the guard stood behind me, spoiling my appetite. He carried a steel truncheon, turned out by our machine shop. "What's on the agenda, Doctor?"

"That's what I want to discuss," he said. "I need to make a good impression on the kya, to undo damage and establish my authority. What would you advise?"

"I think I should go with you." I damned near blurted that.

"I think so, too," Kittrick said. "The kya associate you with O'Donough. That may allay any suspicions they feel at her absence."

"I can tell them she's indisposed," I offered.

"Yes." Kittrick looked grim. "I'm in a delicate position. Everything I've

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done is necessary, but the kya may not understand. We'll just have to do our best."

Oh, yessir, absolutely. I tried not to think about what I was going to do; I was afraid I'd come to my senses and lose my nerve. A little later we took a car into the city, to a place I'd nicknamed the "Crystal Palace." It was something like a miniature United Nations Plaza, not in architecture but in intent. The major kya nations had created an organization for the purpose of dealing with the aliens, and the Palace was an artistic showplace suited to that business.

We entered the office of Eldest Watcher Gavu. It had a sumptuous, vaguely Victorian look, dark wood and brass trimmings which were as functional as anything at our base, but a pleasure to behold. The window overlooked a park.

Gavu motioned us into leather-bound chairs. "Kittrick," he stated, and gave a polite hello sniff. "And, I believe, Baxter." A second, quieter sniff, befitting my lower status.

We sniffed our hellos. "I am here to tell you that I am back in full command of our base," Kittrick said.

"And what of O'Donough?" Gavu asked. He looked at me.

Here we go, I thought. "She ails, sir. To be frank, her mental state has deteriorated. She is no longer capable of performing her duties, and Research-leader Kittrick has been forced to relieve her."

"Please accept my sympathies for her ailment." There was not a trace of sympathy in his voice or face, the old hypocrite.

"I do thank you, sir," I responded. "And if you would, Research-leader Kittrick and I desire to discuss an urgent problem. To be frank, we—"

"What is this, Baxter?" Kittrick asked in English. He looked suspicious; He hadn't mentioned any "urgent problems."

I spoke in kya. "The kya have doubtless noted O'Donough's odd behavior, Research-leader. They must know of my own recent embarrassments. Perhaps they have seen other oddities among our people. We must ask their help in correcting a dangerous problem."

"*Baxter*," Kittrick growled.

"This is no time for false pride, Research-leader. *We must have a new base!*" I looked to Gavu. "We will trust you to charge a fair price, and our government will pay it, but we must, as soon as possible, get out of our base and into *livable* quarters."

I thought Kittrick was going to spit bricks; his face had turned purple. *He* was the Leader; *he* was supposed to run the show. The only thing that kept him from blowing, I'm certain, was Gavu's presence. Kittrick couldn't risk anything that might involve embarrassing explanations.

Gavu made a gesture of encouragement. "Speak on, Baxter."

"Our government made an error, sir. It sent us to live under impossible conditions. I know this has deranged some of my own behavior, and it drove O'Donough mad. The base is bleak, it is boring, it stifles us. We suffer from isolation and—" I turned to Kittrick and spoke in English. "Can you say 'sensory deprivation' in kya?"

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He could, and did, grinding it out. I went on, "We humans need a richer environment. It shames me to say this, but our leaders were careless in this matter, and the result is a crisis."

"My sympathies being aroused, I will ponder this." Gavu scribbled a note and called for an aide. The aide hustled in, took the note and vanished. "It intrigues me that this was never mentioned before."

"We overestimated ourselves," I said. "And, in all honesty, it is impossible to measure one's own sanity."

"Indeed, indeed." And suddenly I was no longer there. I had overacted; maybe Gavu thought *I* was crazy. He focused his attention on Kittrick. "How could O'Donough be driven mad by your base? Such a process would take time, yet to be frank, her behavior has been extraordinary since her arrival—"

"She isn't mad," Kittrick said. "She's incompetent! Her family has wealth and influence. They used *that* to get their precious little daughter sent here. And the things she's done—" He glared at me. "You can't use that 'mentally ill' excuse, Baxter. O'Donough is just an overbearing, conceited little—" Kittrick stopped in mid-tirade, suddenly noticing Gavu's sharp eyes on him. "She is unqualified," he finished morosely.

Gavu looked thoughtful. Was he thinking the sort of things O'Donough wanted the kya to think? I couldn't tell. "I will get back to you," he said at length.

That ended the interview, and I doubted that I'd done any good. Our car took us home, and the minute we got back to the base Kittrick had me under house arrest in my quarters. The charges were mutiny and disloyalty.

You can't stay scared forever, even when you're the prisoner of a fanatic with a mass of dedicated followers. Eventually your adrenal glands squeeze themselves dry and you feel calmer. Someone brought me dinner around eight o'clock, and after staring at the tray for a while I found my appetite. Then I flopped down on the bed and told myself I'd sleep.

I didn't. Hindsight taunted me. I remembered studies on isolation and the way it affects people, both singly and in groups. As Mei Chao had told me, we need a frame of reference, an anchor for our souls, and this base had lacked that.

Until now. Kittrick had given us one, and it had filled our social vacuum like a gas. The base was full of lost, isolated people, cut off from the outside world. There was a mission—the kya and the vault—and enemies—Earth, the UN, O'Donough, me. Those are the prime ingredients for the formation of a cult, be it religious, political, racial or anything else.

I doubt Kittrick knew he was following a classical pattern; he had never been cynical enough for that. He was unbalanced, but still struggling to make the best of an impossible situation.

That didn't mean he wouldn't do anything dangerous. Cult leaders often kill their "enemies" when their world starts to crumble—or when they want their subordinates to prove their loyalty. If things went sour I could get awful dead awful fast.

The door creaked opened after midnight. A bed check? I started to speak

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and was shushed. "We've got work to do," O'Donough's voice whispered in the dark. "We have to tell Earth what's happened."

"What's the rush?" I asked. It sounded dangerous. "They'll find out when the next ship gets here."

"The next ship will be a troop transport."

"Oh." Things were bad enough. Someone might blame the kya for the trouble here. Who else? And it would make a convenient excuse for grabbing the vault. "Let's go."

"First things first." She took me to the door, where my two guards lay in a peaceful heap. We dragged them into my room, out of sight, and then went downstairs. O'Donough had chosen a good time for her move. There were lights on everywhere, but no one was up and around to see us. Still and all I felt as naked as her scalp.

We got down to the comm center level and stopped. Guards. Maybe Kittrick thought somebody would betray him by calling Earth, or maybe he figured he had to do something with all those guards.

We ducked out of sight before they saw us. "Do you know karate?" O'Donough whispered. When I shook my head she drew her revolver from inside her coveralls and handed it to me.

I hoped I wouldn't have to shoot anyone. I'm no killer, even if it's "necessary," and my hitch in the Army hadn't changed my feelings about that. I stepped out into the open with O'Donough.

The guards looked startled. Then they hefted their truncheons. "Forget it," I said. My voice sounded steadier than I felt. I gestured with the gun, and they dropped the truncheons and raised their hands.

"Into the center," O'Donough ordered. Once inside she sat down at the terminal and keyed in. She muttered curses while I kept the two bravos covered. Then the comm system came alive as she broke the authorization codes.

Someone on Earth answered and connected O'Donough to the UN. I don't know who she spoke with, and I have no idea what they said. Code phrases such as "Authentication Sierra Two" and "Status seven-one internal" aren't self-explanatory. Nevertheless she looked satisfied as the exchange ended and the screen went blank. "We're all right," she told me, pushing her chair back from the controls. "I've sent the computer records and I've notified the Security Council that this is an internal problem."

I felt relieved. The kya were safe, and—and—"What do we do now?"

"Surrender." She waved a hand at the guards. "Why don't you two go find Kittrick? We'll surrender to him." I lowered the gun and they slipped out the door. I heard shouts and running feet.

"We could run," I said. "Run and hide."

"Where?" She shook her head. "There won't be a ship here for another month, maybe longer. The UN will keep everything away until they can mount a relief mission. We can't hide with the kya. Even if they didn't hand us back to Kittrick they don't have any food we can eat. So we take our chances here."

"Point taken." I looked at the gun. "Do you have extra ammo for this?"

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I had the rare pleasure of seeing her look puzzled. "No, just what's in it. If you're thinking of taking over the base—"

"I'm not. Get away from the controls."

"John, what—"

"Hurry!" I heard new voices in the hallway: Kittrick was coming. I took aim at the controls. "Get behind me."

She got. I don't know much about FTL radio, but I do know it's delicate—and we had no replacement for the tachyon generator. That was the part I shot. I held the pistol in both hands and emptied it into the unit. The recoil jolted my arms and shoulders like sledgehammer blows, and the *wham* of each shot seemed to go right through me. The radio shattered, smoked, and spat blue bolts. I kept pulling the trigger until the hammer clicked again and again on spent cartridges. The air stank of ozone and gunsmoke.

O'Donough was screaming and swearing. "I hate loud noise, I *hate* it, I couldn't even stand that shit music Mom played, I hate it—" And she became admirably, creatively profane.

We were defenseless now, and Kittrick's followers would probably kill us for what I'd done, but I'd seen no alternative. I'd *had* to wreck the radio—

The door burst open and Kittrick's guards were on us. They slammed me against a wall and I saw stars, and the next thing I recall with any clarity is being held in front of Kittrick. "You disloyal, mutinous mavericks," he said coldly. "What lies did you tell Earth?"

"They know about your coup," O'Donough said. Two guards had a tight grip on her arms. "They're sending an investigator. No ships will come here until then—"

He slapped her face, hard enough to draw a trickle of blood from her mouth. "You can't keep from wrecking things, can you?"

"We ought to kill them," someone suggested, a thought which drew an animal rumble of assent. I saw a man holding the gun, but without bullets it was a useless toy. At least I had thought that far ahead.

"You need us," I said quickly. "We're still useful."

"I doubt that," Kittrick said. "You two are relics of an inefficient, feeble-minded system."

"A system which has the starships you need," I said. "You have to import all your food, vitamins and medicines, Doctor; you can't use kya supplies. If you're going to maintain your position you need both of us as bargaining chips."

Somebody cursed me. "We have the vault."

"Not yet," O'Donough said.

Kittrick laughed at her. "We'll have it—and soon, now that we're free of your meddling incompetence. You're fortunate that we don't *need* to contact Earth—"

"Kill them," a woman said. "Kill them and be rid of them!"

"You don't throw away something useful," I said. I had a desperate hope that Kittrick believed his functionalist cant. If he did O'Donough and I just might survive. "That's wasteful. It limits your options. And that will make it harder for you to negotiate with the UN. You still have to use them."

He stared at me for a long moment.

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"You may prove useful," he conceded. "And it's inefficient to waste the useful—so long as it remains useful. Remember *that*. Take them away."

So I ended up in a small room, stripped of everything but a bare cot, sink and toilet. The door had had a small slot cut in its bottom, just big enough for a dinner tray. That was thoughtful of them, because as soon as I was inside they welded the door shut. A short while later bars were added outside my window. My cell may not have been escape-proof, but I couldn't prove it wasn't.

Maybe sealing me away was thoughtful of Kittrick. His guards had been ready to kill O'Donough and me, and I had seen the beginnings of fear in his eyes, as if events were slipping beyond his control.

I lay down on the cot and thought about what I'd done. Most of the people on the base were geniuses; the rest were smarter than that. They could have worked out a plausible story, something that would explain away O'Donough's call and forestall a rescue mission. Now they'd never have the chance to bamboozle Earth. Even better, O'Donough's distress call would now be followed by a profound silence. That ought to give the rescue mission a sense of urgency.

Maybe. I certainly had the time to think things over, when I wasn't trying to chip an escape hole in the outside wall. I was still wondering and chipping when the *Verne* arrived and dropped a shuttleload of Spetsnatz commandos square on the base.

"You were brilliant," O'Donough said. "You should have my job."

"No, thanks." We were at the airport, and I was carrying her suitcase up the ramp into a shuttle. "I was just trying to save our necks."

"That's what I mean. You negotiated a deal that worked. You turned us into assets, so Kittrick had to keep us alive, and you did it on his terms."

"I didn't have much choice. I couldn't threaten anyone with reprisals. No one would've listened, and it might have goaded them into proving I didn't scare them."

"That wouldn't have kept some people from making threats." She stopped me halfway up the ramp. "And telling the truth to Gavu, and destroying the radio, and reasoning with Kittrick—that all took guts. Anyone can be a hero when they think the world is ready to cheer and give them a medal. The real heroes show themselves when they're scared, and everyone's against them, and they think no one will even know what they've done."

"Don't try to flatter me, O'Donough."

"I won't." We got into the shuttle, and she leaned against a bulkhead while I stowed her bag. A crew woman looked into the compartment, stared at her haircut—she still had that damned, ugly Mohican—then ducked out of sight when I glared at her. "And not only did you keep us alive," O'Donough said, "but you finished my job for me. Things worked out."

That was one way of looking at it. I'd spent much of the past month wondering how the kya would see the insurrection. As it happened there was no problem. The kya had continued watching us, taking notes and biding their time. The disintegration of the base taught them a lot about humanity, giving

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them an extra perspective—much like engineers testing a machine to destruction. That, and my outburst in Gavu's office, helped persuade them that our races were more alike than not.

By the time the *Verne* arrived the kya decided they had the measure of us. They hadn't agreed to let us into the vault, not yet, but once we had the base back under control they were willing to open full diplomatic relations. We were no longer sinister monsters from space; we were fallible, funny-looking kya. They could live with that.

And we had things to live with as well.

I rested my arm on the bulkhead and leaned over O'Donough. We had been rescued three days ago, and we hadn't had three minutes together. Granted, we'd spent some time together in debriefing sessions, but that's not the same. There were things I needed to discuss in private—and she had orders to go home today. This was my last chance. "You were using me as more than a spy," I said.

"It helped if it looked like I had a lover," O'Donough said. She was silent for a moment, while the shuttle's intercom gabbled something about the launch schedule. "It created another division for the kya to study—you on one side, everyone else on the other—and that stirred up more tensions. It's the same reason that I told you and a very few others about Correy III. I wanted to create more divisions, more strains, the more the better."

I felt skeptical as all hell. "You were also isolating us. You knew how a secret like Correy III would pressure us. And as for me—"

"You were dangerous. You figured out some things, and you might have figured out more. If you had told people that the staff was observing us, it would have influenced their behavior, and *that* would have wrecked everything. I told you before, the kya needed to see us under a strain."

"So you neutralized me." And messed up my life, and made me look like a fool. . . .

"And I broke up your romance with that Russian."

"To give the damned kya something else to study." The kya had never seen a human go stir-crazy with love. Their observers had seen plenty of casual sex, temporary friendships, mild quarrels, but nothing deep, nothing passionate; even Aelita's romance with Thayer had been a restrained thing. My escapade had shown them a dimension they'd feared we lacked.

O'Donough was strangely hesitant. "I'm sorry I hurt you—"

"But you had to prevent a war."

"That, too. But I liked the time we spent together."

"So?" I said gruffly.

"John, didn't I tell you that I'm *always* up to something else?" And she rose up on her toes, put her hands on my shoulders and gave me a kiss that I won't even try to describe. She pulled away after a good long while, and I could swear she looked as though she'd surprised herself. "See you on Earth?"

I didn't know what to say, but I must have nodded, because she smiled and vanished into the shuttle's passenger bay.

I left the shuttle, stepped back and watched it float up into the sky. After

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a while I walked back to the car and rode back to the base.

The base was still occupied by Russian troops. They were patrolling everywhere, ostentatiously reminding everyone that the UN was back in control, and it dawned on me that they and Aelita came from the same country. Strange—I hadn't thought about her for weeks, not until O'Donough mentioned her.

That realization only added to my confusion. I'm not fickle, and I'd burned for Aelita, but—I still don't know. Maybe my infatuation had had more to do with the mind-bending life I'd led here than with an appreciation of Aelita's true self. I'd been clutching an illusion.

So had a lot of other people, and they were worse off than me. The rescue ship hadn't been prepared for a psychological disaster, and its tiny medical team was swamped. A lot of people broke down when the commandos broke up Kittrick's kingdom. The best they could do was to pass around cheer-up and calm-down pills, while tranquilizing a score of the most serious cases for shipment home on the *Verne*. One of them was Kittrick.

It was almost three months before I could go home; the doctors decided I was in fair shape, and the medical cases had priority. It was a busy period, which kept my mind off certain things. The *Verne* had brought a new UN diplomat, and he arranged for us to abandon the base and move into the city. Between the move and the work a fair percentage of ex-mutineers showed improvement in their mental health. Some of them were almost recovered by the time I hitched a hop on the *Southern Cross*.

I had been told that my trip home would be a "decompression experience," and that sounded so much like "vacation" that I had looked forward to it. It turned out to be hard work, an intense educational course on current events and daily life on Earth. Maybe that was a good idea—I'd been out of touch too long, and this would help me slip back into the human race. I'd had enough of playing the outsider.

Southern Cross was the pride and joy of the Australian Space Agency, and her crew reflected that pride. And joy—like most spacers they'd packed along some beer, an Aussie brew which comes in cans which bear a striking and appropriate resemblance to depth-charges. The "night" we left Kya they put some spin on the ship and increased the air pressure to Earth-normal, so we could drink the beer the way God intended.

Naturally enough, these six guys (it was an all-male crew, for some reason) wanted to ask me about the mutiny. I had trouble talking about it, and after a while they dropped it. "Krikey, what a fix that was," the captain said. "Can't blame you for wanting to forget it, Yank."

That was considerate of him, but I didn't want to forget it. I wanted to think about it, which is different. O'Donough had said something, right before she left, and I didn't think she knew how much it meant. It had been something obvious: that if everyone had realized the staff was observing our every act, we would have behaved differently. I could believe that. Knowing that you're being watched makes you watch yourself. And if everyone had known—

No, that wouldn't have stopped what

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happened, any more than O'Donough had started the mess. The real problem had been our isolation. We'd had no one to tell us we were drifting into madness, no way to judge ourselves.

Much like Earth itself—you think not? Perhaps the only differences between Kittrick and Hitler were a matter of scale and luck. In many ways humanity as a whole has always behaved as we did at the base. We have a century-old arms race which involves a dozen nations, mandatory euthanasia laws, suicide cults and vigilante clubs, widespread poverty, and other things which almost everyone takes for granted. You'll never convince me that Earth is a saner place than the base was.

And some of the people at the base did improve after the *Verne* arrived: after an influx of new people, after a move to a new facility in the heart of the city, after we found ourselves dealing with more and more kya every day. That made me think.

Perhaps many of humanity's problems come from our isolation. It's not strange to refer to an entire planet with billions of people as "isolated," not after you've stood on alien ground, looked at the night sky and discovered that even our Sun is invisible. We have been utterly alone ever since we evolved, dependent on our own resources, our own ways of thought. And they are not enough.

Spaceflight has brought us to the kya. They have their own way of looking at things, their own ways of thought. If we could form an interstellar culture with them and break our racial isolation—well, I don't imagine we'd have the dawn of some cockamamie Golden age, but I'd expect some slow improvements in our society. The kya could supply the external frame of reference we need, watching us and making us watch ourselves.

Maybe it was just a pipe dream. I decided I would have to discuss it with O'Donough when I got back to Earth. She might know if there was anything to the idea, and—well, it would give me a reason to visit her. I didn't exactly miss her, but I did miss the talks we'd had.

It might be a while before I got the chance to see her again. Back on Earth she was a hero, as I discovered during one of my decompression lessons. I saw a vid of O'Donough receiving a ticker-tape parade through the streets of Manhattan, after which she was presented an award at a ceremony before the UN General Assembly. I could see the camera lights shining on her scalp while Secretary-General Li hung the medal around her neck. I could also see the look on his face, and thereby hangs a tale.

There was panic in the UN building after the mutiny broke out. O'Donough's message, and the silence following the destruction of the radio, spurred more than a rescue mission. Her report made clear what had happened, and to the politicians and bureaucrats responsible for the disaster, the truth was intolerable. They needed a scapegoat, and the effort to discredit O'Donough began even before the *Jules Verne* left Earth orbit.

It might have worked. Ambassador Phillips had the flatshot I'd zapped him, showing O'Donough in all her splendor. He had it leaked to the press, along with

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selected excerpts from her message. While murky, those excerpts made it appear that she was behind the mutiny, and that the base had been running smoothly before her arrival.

It was the UN's bad luck that the mutiny had grabbed the attention of Earth and the colonies. The public demanded news, and with nothing but silence from Kya the press focused its attention on the UN. It took two days for an enterprising reporter to extract O'Donough's full message and other reports from a secure computer, and two minutes to download it onto the newsnets.

The official version of events collapsed in short order. With eagle-eye hindsight, a variety of sociologists and psychologists proved that the base had been headed for trouble from the start: too isolated, too barren. And anyone who read O'Donough's final message could see that she'd risked her life to send it. It made for a hell of an image, a lone woman against several hundred maniacs.

By the time she got back to Earth there had been a mass of resignations at the UN, and some of the resignees moved to countries which didn't hold with extraditing wealthy refugees. Plans to invade Kya and take the vault were leaked, which added to the scandal. The UN needed a hero to divert attention, and O'Donough was the only one they had.

Maybe that's why she kept her hair cut. She must have known that the UN had tried to set her up as a villain, and her Mohican may have been a silent rebuke. I do know that when the Secretary-General hung the medal on her, he looked like he wanted to hang her as well.

I could do it for him. Not because I didn't get any credit for what I'd done, and not because I had any grudges against O'Donough. In fact, by the time I got home I wanted to talk her into growing her hair back. But she's a hero—and if imitation isn't the sincerest form of flattery, it's the most common.

Smooth scalp, high blonde crest, trim figure: I'd thought O'Donough had decided to greet me when my shuttle landed in Los Angeles. I was about to call her name when I noticed five other women in the terminal with Mohican hairstyles.

That was over two weeks ago. At first I'd hoped it was only a snap fad, but every day I see more Mohicans. The sociologists say it has something to do with hero-worship, just as Alexander the Great's imitators made shaving commonplace. A lot of people want to look like a winner. To the kya it's an understandable example of herd behavior, and they think it helps to prove that our races have a lot in common.

The funny things is that, now that I'm used to it, it doesn't look too bad. ■

●A conscience is the price of morality, and morality is the price of civilization.

Tom Clancy *(Patriot Games)*
Submitted by John Hradsky

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MOON MEMORIES

L. Jackson Gardner

Any developing society has problems and must set priorities—but there are certain fundamentals it should keep in mind in doing so.

Randy Asplund-Faith

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"Damnedest thing I ever seen," said the old man. "They was comin' down the road, singing, their faces all lit up inside, some of 'em no more'n twenty, mebbe younger. Ah, that were sumpin' to see!" He took a pull on the jug and settled his crooked back into a matching cavity in the decrepit kiln; they complemented each other, the furnace and the old man.

I was thankful, then, for the company, decrepit or otherwise, though I've regretted it since. Winter was getting on and soon I'd have to head further south, maybe beyond Mexico City this time. I'd been up in Canada the month before, following the harvesters, getting what work a casual laborer could, eating regularly (at last!) and happy for purely mechanical troubles: I could fix those. Then the combines were done for the season. I'd be back in the spring for the winter wheat harvest, working up through Missouri and Iowa; but for now my stored fat would have to see me through to Laredo or El Paso. I had been thinking of maybe striking out to Baja but a picker I'd met in Charleston had word that the rains had never come and the only thing worth picking from Gallup to Los Angeles was a few weathered bones. The desert Southwest was too tough for me.

Then I found a group heading for Okeefenokee and the easy life deep in the swamps. I decided to tail along with them for a while. When we got to South Carolina a few of us broke off West while the rest slipped over the border. We all, of course, had painted our faces rusty green to fool the border guards. Their dogs were tougher to avoid. A lot of our hoarded meat went down fat border patrol canine gullets. It was worth the sacrifice, though; the Carolinas used to be pretty country and I guess the Governor is set on having it that way again, but mostly the work is done by migrant workers. They don't have any retirement plans in the Carolinas.

We got caught in an early winter storm and I lost the rest of them at about the Alabama-Mississippi border. After waiting along a turnoff to I-10 for two days, I gave the rest up for lost and kept on alone. Guess I got tired of seeing all those cars whizzing by, full of rich foreigners traveling cross-country in style and comfort.

I reckoned I was some miles northeast of New Orleans when my horse went lame and I noticed that I was being followed; but not the sort of follow you like to find having done to you. It made a nasty sort of tiny crawling go up the back of my neck. I kept looking around and though I didn't *see* anything, I knew someone was looking at me in a real mean way.

Well, I'd had that sort of follow before so I turned down a road that looked like it used to be a main thoroughfare into a New Orleans suburb, got a small empty house between me and the eyes, and stopped. I tied the horse to the back porch, untied my pack and lit out into the trees, scrambling into deep thicket. You make a bunch of noise getting into it, but no one can come at you unawares.

The bad follow stopped. I waited maybe two hours, trying not to itch or sneeze, and didn't hear much more than some voices come from where I'd abandoned my horse. I guess that's all they wanted. He was a good-looking animal but I would have had to sell him at the

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Mexican border anyway: too conspicuous a target further south.

Dark started closing down overhead. Even southern nights, if spent in a swamp, can be cold, so I took bearings as best I could and moved southwest. From what I remembered of the surrounding area, I'd hit I-10 or another freeway curving down toward New Orleans from the north sooner or later, and maybe find a Holiday Inn outside of town. Downtown New Orleans was too rich for my pockets.

But I guess I had been spooked by the bad follow more than I wanted to admit and it didn't take too long for me to realize that I was getting myself very lost. The swamp just went on and on, though it wasn't as bad as the Okeefenokee. I got soaked clear up to my armpits, and had a few new tears in my clothes. I crossed 'gator tracks once or twice and maybe I heard one off to the side, but I didn't meet one, which was just fine by me. 'Gator can be good eatin'; I didn't relish having one think the same about me.

The light was fading fast by the time I finally stumbled into an open space. But *what* an open space! I simply stopped dead in my tracks for a while, then sat down and stared at it,

It was a building. Actually, it was a complex of buildings but one was *enormous*. A whole airport could have fit inside it, runways, hangars, tower and all. It wasn't that tall, maybe two, three stories, but it just went on and on. Cranes, trucks, all sorts of equipment stood around, looking as if they had been engaged in heavy activity just moments before. Maybe the crew was on a break.

Then I noticed the weeds growing between deflated, rotting tires. Rust draped down crane shafts and over truck sides. Lichen scabbed the buildings' pockmarked concrete sides. The huge doors, wide as a ocean-going steamer, stood open amid debris, drifted leaves, and broken cables. Clearly no one had worked here for ten, maybe twelve years; probably not since about 1992.

I wondered if anyone *lived* there since then. The place didn't inspire any fear, though, and I found that strange because huge deserted buildings usually became weed or crack hangouts, home bases to various characters whom your mother would never invite home to tea but whom your mother might shoot just to keep the gene pool clean. I must have stood there ten, fifteen minutes, trying to figure out the building and what to do, and in that time the sky glow dimmed and it really began to get dark. I was still far enough from New Orleans that the city's nightglow would hardly be more than a smear on the horizon.

A night wind started fingering the broken cables and Spanish moss that bearded a few saplings that had taken root in the concrete apron around the building. I hitched my travel bags back on my shoulder, got to my feet, and started a slow cautious circuit of the place, still unable to keep my eyes off the immense, lonely structure. I was about one quarter of the way around it when I spotted a small fire accompanied by a human shadow moving around it. It was built against what appeared to be an old outdoor furnace, or kiln, which was in front of what had obviously been the huge building's main entrance. Horizontal bands of narrow windows, faced

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with aluminum panels, were concentrated near a glass-walled foyer with double glass doors; only the glass of windows and doors was gone, and much of the aluminium, though such thin brittle stuff was useless; and it took too much energy to melt it down

A sudden harsh scream, inhuman and terrifying enough in a lonely place but made all the more awful with that old empty building looming against the stars, came from the firelight. I nearly jumped out of my skin; the human shadow jerked upright, then quickly vanished. I was still trying to recover my breath when a rusty old man's voice querulously demanded "Who're ya?!" from the darkness beyond and a little above the fire. "I got a gun!"

"So do I." I raised my empty hands high over my head. "I'm harmless and I'm lost. Hospitality?"

"Who're ya? Where you from?"

"I'm drifting down to Mexico for the picking season. I just finished the wheat harvest in Canada and had a hankering to see New Orleans again."

"Uh!" The voice wasn't impressed. "Step over t' the light so's I kin see you better. Where's yer piece?"

"Where I can reach it if I need it. I don't want any trouble, just a warm fire for the night." I walked slowly into the light and saw what had alarmed the old man: a red-tailed hawk, tied to a perch, eyed me much as she might eye a rabbit. She blinked at me once, screamed again for good measure, and bent to rip at her meal of raw meat with fierce indifference.

"He he," came from the darkness. "Red's t' bestest watchdog I ever had." I heard a soft scraping sound and the old man abruptly materialized just on the firelight's edge. He was wizened and bent; ropy black flesh hanging from skinny bones. The firelight made his face into a mass of moving wrinkles from which his eyes shone as clear and deep and brillant as stars. He pulled back his lips in a dazzling smile. "Yer clothes mightn't be th' best, but yer patches are neat. Kin always tell a honest man by his sewing. Set yerself, boy. Stew's almost ready."

After the thick meat stew (courtesy of Red) and a smoke (mine, from a trader in Virginia) and his tale about how he had caught the hawk and tamed her, he got up, left the light for a moment and returned with an opaque plastic jug. He sloshed it suggestively.

"Crik water's all right fer daylight, but company's time fer a *drink*." Smiling, he offered me a pull on the jug. It burned like dry ice all the way down, then ran liquid fire from my belly right out to my fingertips. I went warm all over.

"*Good* moonshine," I gasped, handing the jug back to him.

"He he." Balancing the jug on his elbow and shoulder, he expertly tilted a thin stream into his mouth. "Moonshine," he said, handing it back to me. "Young'un like you won't know that moonshine's a good name fer stuff made here," he swept his arm to include the huge building hulking empty in the starlight. I followed his gesture, then looked further up. A very bright unwinking point of light, brighter than Venus, was speeding from northwest to southeast. It flashed once as it came overhead. In silence, we watched it fade out of sight.

"Huh," he grunted. "Russkies.

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Mebbe an old Mir by its orbit an' magnitude."

"Yeah? And how would you know?" I took a drink, handed the jug across the fire.

"Yeah." He took the jug from me but made no move to drink, fingering the spout instead, while he gazed at the sky and the building. After a while he dropped his gaze to me. The fire danced miniature in his black eyes. "I know things. Like, I betcha don't know where you are, young 'un."

"Somewhere outside New Orleans," I affirmed.

"This here's Michaud, and this here's where they used to build rockets that went to the Moon, and rockets that put shuttles into space, and rockets that some tried to turn into space stations."

"No! Here? They used to do that *here?*" I looked at the old building with new respect. "Wow."

"Huh! 'Wow.' Yeah, wow. I useta work here, d'ya see; that's how I come t' know things. I weren't no fancy engineer, just maintainence, but I got eyes and ears. I *saw* them rockets. They was lovely and so huge you coulda lived in one real comfortable. You seen them big semi-trailers out there? Well you could put *three* of 'em in *one* of them rockets an' had plenty a' room left over. I remember them what they called external tanks, lined up in a row, looking like the biggest bullets you ever seen just a'waitin' to go into space; looked almost like they was a'beggin' to go, to get up an' do what they was borned to do; like a race hoss when he's jest beginning t' understandin' what his legs is fer. Yessir, they was our ordinance to the future. We was on our way to the stars, boy. We was *on our way*. Yessir." He stopped, staring at nothing, then hastily lifted the jug and took a long pull. He forgot to share it with me until I tapped his hand.

"We was the first to the Moon, you know," He fixed me with those burning eyes of his. Were they reflecting the fire between us or was their light growing too pure and bright for a purely Earthly—and comfortable—fire? "We built them Saturn rockets that went to the Moon right here, too. Mightiest engines in Creation they was then, designed to take men beyond this here mudball to someplace we'd never been. Never. And we went. And we came back. And we never went again. Gimme that jug, boy."

"But I've heard there are colonies on the Moon and Mars—" I began.

"Sure there are, boy! Lots of 'em. Only they ain't 'Merican. But they coulda been! They coulda been!" He drank hastily, dribbling some of the liquor down his stubbled chin. "Lemme tell you one of the damnedest things I ever saw. This was back in '90, mebbe '91, and the space program was havin' jes a turrible time. Folks was sayin' as how we had to git down to Earth and solve problems here afore we could go galivantin' out to them stars an' planets. An' those of us here that was a'buildin' the ET's and rockets, we was real scared we'd lose not just our jobs but our *dreams*." His voice sank briefly to a reverent hiss. "That's what we called it: The Dream. Mebbe we shouldn't a called it that, 'cause that made folks not pay it much mind, dreams havin' a way of bein' insubstantial and fadin' under daylight's scrutiny, ya might say.

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"So here we was, worryin' and hopin' and keepin' to th' job, and in comes the Big Man and he says as how the money's gone and we can't build no more rockets because he can't pay us. The material was all there, d'ya see. Tons of gleamin' steel and all the tools and such, but no money to pay us to do th' job. Just then someone sez that there's this here parade comin' down the road; all kindsa folks comin' our way. We was afeared it was some of them Creationists or book burners come to root us out because science and buildin' rockets was an evil work of the Devil. That was jus' 'cause they didn't understand what we was doin', d'ya see. Anyways, our security guards got themselves atop the roof and we locked the doors and some of us started lookin' around for spanners and wrenches and such to use fer weapons.

"Then we started to hear the singin'. It were mostly young folks, though they had some clear up to my age totterin' along with 'em and they was singin'! Singin' about how they were gonna build starships; about how they cheered every launch; about how the souls of astronauts who had died explorin' space lived on in space ships; about how we was a'runnin' outa resources on Earth an' hadta git industry off th' planet and out into space; about how hopeful th' future can be. What a sight, all of them marchin' and singin', 'and they came right here, right into this here building and damned if they didn't *volunteer* to build the rockets. Not askin' a cent, mind you! They was here outa love. They stood and sang and pleaded to build the rockets.

"Wellsir, th' Big Man he says 'You cain't build no rockets,' and the marchin' folks say 'Yes we can!' and it turned out that yes, they could do it because some of them come all th' way from Florida an' Texas and all where they had made rockets afore this.

"Of course there was more talk and some of the young people got plumb flustered at doin' nothing and went away before it was all over, but in th' end, by God! they was in there a buildin' them rockets! And still singin'! What a sight. Gol'damnedest thing I ever seen." He sighed and took a deep pull on the jug.

"So how come they aren't here now?" I challenged. Everyone knew that going into space was for the rich, highly technological countries, not agrarian America.

The old man set the jug down, his fingers tracing a faint design etched in its side. It might have been a word; I couldn't read. He was staring out at nothing again.

"Hey! What happened? Where are they now?"

"Eh?" He turned his attention to me, but his eyes looked right *through* me. I shivered despite the fire's, and firewater's, warmth. Those eyes for all their inner flames were as cold as space's black gulfs are said to be. "What say?"

"Where are your singers and rockets now? This building's been empty for years!"

"Deserted many years," he said softly. "But I still keep an eye on it, d'ya see. In case they come back."

"Where did they *go?*"

"Well, boy, I ain't all that bright, an' I weren't no engineer, so I ain't certain what happened. Near as I could figure

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it, th' rockets were built but they couldn't be flown because there was no money fer it, d'ye see. The government up in Washington didn't hold with spendin' money fer th' future because they had to worry 'bout gettin' reelected. An' companies couldn't spend th' money because they wanted it back right quick. One problem with space, boy; it pays off handsome, but it pays slow. You might know that from all them fancy cars hummin' down I-10: hardly one of 'em's owned by a 'Merican. Them's all Russkies or such.

"So th' machines stopped, and th' young ones stopped singing. The light went outa their eyes, so they left. I heard tell some of 'em went to Japan an' Brazil and Russia t' build rockets there. Maybe they built that old Mir that went over." He sighed and put the cap back on the jug. Getting to his feet—quite steady for all the hooch he had consumed—he slipped a hood over the hawk's head and stood for a while, stroking her crisp feathers while he gazed up and out at the perfectly dark night sky. The Milky Way seemed to glitter with especially painful brillance.

"What happened was we stopped havin' dreams, boy." His voice's weary grief hunched his shoulders under the weight of sky and night. "We gave 'em up t' fix things here." He glanced down at me. "Strikes me, though, that if you try to git a baby to walk, then talk, then use th' toilet, all in a line, like, without mixin' all them things together, and without toleratin' any mistakes along the way or lettin the poor thing play with other kids, you git a mighty ignorant child by th' time yer done. Which you never is." He snorted. "But I'm jes th' old man what used to sweep up after. Don't pay me no mind, boy; I'm a mite touched in the head these days."

He gestured to a pile of folded blankets in a niche. "You help yerself, boy. I think I'll stay awake awhile longer. If'n you git an early start you might git t' N'awlins by evening. Y'all find some decent stables in th' city an you can git on yer way south from there. Ever been to Houston?"

I shook my head. "Never have. Why?"

He turned around, again facing the deep star-charged night. "Jes as well. Mebbe you shouldn't see t' big Moon rocket there; mebbe you shouldn't have dreams t' way we used to. Go to sleep. You got a hard road ahead tomorrow."

Since that night I haven't been able to get the old man, and the huge empty building where his hopeful future had started and ended, out of my mind. And of late the stars seem awfully far away. ■

●Too often we give children answers to remember rather than problems to solve.

Roger Lewin
Submitted by John Hradsky

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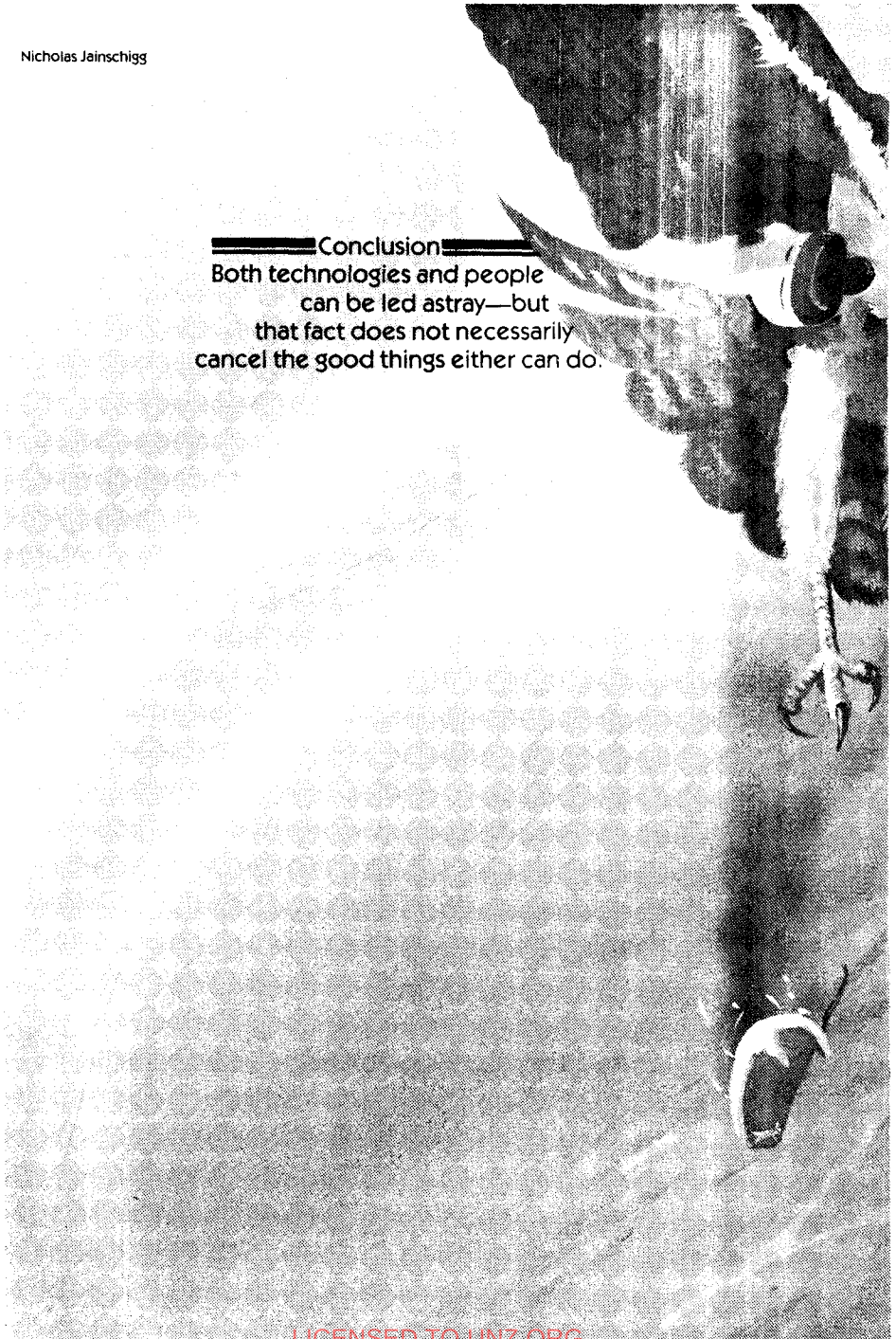
Nicholas Jainschigg

Conclusion

Both technologies and people can be led astray—but that fact does not necessarily cancel the good things either can do.



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When five-year-old **Andy Gilman** *spotted a Chickadee the size of a Piper Cub in the backyard, no one expected that his mother* **Emily** *would soon be threatened with death. But that was the case. The danger began when* **Nick Gilman** *and Andy fetched Emily from the airport and a Palestine Airways Sparrow landed on the highway and began to gobble Buggies. The Gilmans (and others) were rescued when the police arrived. Among the cops were detectives* **Bernie Fischer,** *who had been investigating a mutilation-rape-murder in Greenacres, a suburb where many of the houses were based on gengineered plants, and* **Connie Skoglund,** *Bernie's sometimes lover.*

Emily worked at Neoform Laboratories where she had been gengineering a Bioblimp from jellyfish stock, and colleague **Ralph Chowdhury** *had been developing a road vehicle from armadillo stock. At a meeting the next day,* **Sean Gelarean,** *the Palestinian-descended research director, revealed that he was aware of the Sparrow attack. Emily reported that the Bioblimp patent had been postponed, but there was strong interest from Mayflower Van Lines. Chowdhury revealed himself to be a cantankerous, self-centered child of South African refugees who hated blacks. Emily and her assistant,* **Alan Bryant,** *antagonized him by criticizing his "Armadons."*

Meanwhile, police and federal investigations had found no sign that terrorists had taken over the Sparrow. Instead, an extra computer chip turned up in the jet's control computer. The suspicion was that the chip contained a virus-like program designed to preempt the Sparrow's controls. Bernie Fischer visited Emily to learn how such a chip might work.

*On returning from the meeting at which Emily and Alan criticized his Armadons, Chowdhury chased his assistants—***Adam Chand, Micaela Potonegra,** *and* **Sam Dong***—out of the main lab. He was a strange fellow, given to anachronistic lab furniture and immense hatreds. Most ominous of all was his secret life—gambling debts had driven him to design drug-secreting bioforms (nettles, jellyfish, and snakes) for the mob.*

At the Gilman home, a strange bittern-like bird appeared. The Chickadee, which the local airport could not seem to keep in its hangar, chased it off before Emily could see it. Nick called the airport to fetch the Chickadee, but both birds were back the next morning, and when the "bittern" attacked Emily—she recognized it too late as an Assassin bird, a covert military weapon—the Chickadee killed it, taking a mortal wound in the process.

Why was the Assassin bird after Emily? No one knew, and when Bernie arrived as part of the police contingent he could not help. In fact, things turned worse when Nick jealously objected to the familiarity Bernie and Emily had developed.

On the way back to police headquarters, Bernie was diverted to the local airport, whose manager had called to complain of a dead Chickadee. Bernie examined the corpse, checked out the hangar, and found buried under the hangar's dirt floor a cache of cocaine-nettle seeds. After arresting the airport manager, **Frederick Conal,** *and re-*

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porting the find, Bernie visited Emily at her lab and learned that she and Chowdhury were rivals and that Neoform was the company that made Assassin birds. They went out to lunch together, and later, on Connie's repeated encouragement for him to make a pass at Emily, he thought he just might do that.

But before his next opportunity, Bernie had to examine the pumpkin house in which **Jasmine Willison** *had been killed. He found two overlooked clues in a wastebasket, instant photo film packages and a nettle leaf. Unfortunately, over the next few weeks, the Willison and Sparrow-attack investigations failed to progress. The stalemates ended only when Emily received word that her Bioblimp patent was being awarded and Neoform's research chief, Sean Gelarean, invited everyone —including Bernie—to his Greenacres house for a celebratory party.*

The Gelarean house was a crooknecked squash dressed to resemble an English Tudor manor house, complete with tower. **Victoria Gelarean,** *the daughter of the Campana mob family, was short, round, and meek; she wore a crimson monk's robe whose hood concealed a vividly birthmarked cheek. She and her husband were gracious hosts, but most people were paying attention to Emily. One of the few exceptions was Nick, who spotted Bernie leaning against a wall, chatted awhile with Chowdhury, learned that Chowdhury lived not far away, noticed that Bernie stiffened when Chowdhury mentioned the attempts on Emily's life, and later watched Chowdhury with a rotund fellow in a pink tux. He also tried to explore the house, hoping to find the entrance to the tower, but Victoria steered him away from a locked door and back to the party.*

The fellow in the pink tux was Chowdhury's master, **Greg Florin,** *the casino boss to whom he owed so much. When he beckoned, Chowdhury came, dancing attendance, fawning for praise and the promise of freedom. He got the praise, for his masters were quite satisfied with the nettles, jellyfish, and snakes, and they wanted him to begin production immediately. Feeling good, when he left the party he tried to pick up a black woman walking on the street. He failed.*

Next day, Bernie's boss, **Lieutenant Napoleon Alexander,** *tried to take him off the Sparrow-attack case because he was spending too much time sniffing after Emily Gilman. Bernie should, said "the Count," concentrate on the Willison murder. Bernie defended himself by insisting the two cases were linked: Jasmine Willison had been killed in Greenacres, where several Neoform people lived, the Assassin bird was a Neoform product, and Chowdhury might well wish Emily dead. In addition, he said, Greg Florin had been at Gelarean's party, and he had found a nettle leaf at the scene of the Willison murder. Finally, the Count was convinced. Bernie could stay on the scent. Later, Connie pointed out that the Count's attempt to call him off surely meant that someone at Neoform was getting nervous about his frequent visits. Her point was underlined when, on their way to lunch, Bernie and Emily were attacked by a runaway Mack truck. Bernie shot the bulldog-like Mack; after the cops, including Connie, appeared, he and Em-*

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ily continued to the motel restaurant to which they had been going, but they had no appetites for food. They wound up in bed together.

Later investigation revealed that the Mack, like the Sparrow, had a foreign chip in its control computer. Bernie took the chip to computer expert **Henry Narabekian,** *who decoded the hidden program and revealed that as soon as the Mack saw Emily, its computer would activate its territoriality circuitry and the genimal would go for her throat. At the motel restaurant again, with Chowdhury sitting at a nearby table, Bernie told Emily what he had learned and that he now suspected a specific person of being behind all the attempts on her life. They went to bed again.*

Not surprisingly, relations between Emily and Nick were strained, and they were not helped a bit when Connie, visiting the Gilman house to question Emily about the Mack attack, dropped a broad hint about Emily's and Bernie's extracurricular activities. In the process, Connie revealed that she, too, like Nick, was jealous, and this began to bring the Gilmans back together. Emily left for the lab. She was somewhat confused about what she really wanted, but her uncertainty evaporated when the Tortoise failed to respond to its controls, shifted into the leftmost lane of the highway, beside the median, and tried to hurl her in front of an onrushing smoke-belching truck. She saved herself by yanking the mother board out of the Tortoise's computer. The vehicle then stumbled to a stop, giving her a chance to remove the chip her unknown enemy had planted on the board.

* * *

Chapter Sixteen

Bernie turned the chip over and over in his hand, staring at it, studying it. Finally, he said, "We're getting quite a collection of these things, aren't we? The Sparrow, the Mack, now your Tortoise."

He had had to wait in Emily's lab for half an hour. Alan Bryant had explained that she was in a meeting, and yes, it was running late. Then he had turned back to his work, and all Bernie could do was watch the pretty pictures on the workstation screen. When she had eventually arrived, she had led him to what passed for Neoform's company cafeteria, a row of vending machines in an alcove near the second-floor stockroom. They had the room to themselves.

There had been an uneasy silence when they first sat down. Eventually, she had said, "That meeting. Sean wanted progress reports on our work, but that wasn't all." As she spoke, she watched the hallway outside the alcove, not him. She seemed to be looking for some particular person. "He said you didn't seem to be getting anywhere and were just wasting people's time. He meant mine. He wanted to bar you from the premises."

"Does he have a guilty conscience?"

As she shook her head, releasing a flood of aromas—perfume, shampoo, the smell of the back of her neck, which he had tasted twice now—he snorted. A warrant would get around such a ploy too easily. Or if he wanted to see Emily, a phone call, and she would come to him outside. They had both enjoyed their encounters on the sheets, and he hoped there would be more. She was wearing a light blouse that let him see

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the straps of her bra and a skirt of some thin, summer-weight fabric.

"I told them about the Tortoise, though. And he gave up," she said.

"You made it clear that the problem wasn't over."

She nodded vigorously, her wide mouth smiling at her victory over her boss, and produced the chip. She held it out to him. He took it, and he saw immediately that it was as identical as she had thought to the others. When he gestured for her to go on, she told him the rest of the details.

Now she said, "And I didn't have to shoot it."

He grimaced. "I wouldn't have thought of that. Pull the board and yank the chip. Instant repair." He looked up from the chip, ignoring the plastic-wrapped sandwich and cardboard cup of coffee in front of him. "Very quick. Very cool. Congratulations." He meant it all. She had done the perfect thing under the circumstances.

"What would—"

"Shot it." She seemed cooler toward him, as if she did not look forward, like him, to going to bed together again. Was she having second thoughts? "Pulled out my gun and blown its head away. That would have stopped it."

She made a face and looked at her food. "But I still have the Tortoise, alive."

"That's true." He eyed his sandwich at last. He had pushed the button for tuna fish on rye, but it looked more like canned cat food on dirty foam rubber. "Do all genimals stop like that when you pull the plug?"

She held one hand palm upward, fingers spread. "I knew the Tortoise would. I read the owner's manual after Nick and I got married, and I thought I remembered that. But others? Some Buggies, I think. But I really don't know for sure."

"I suppose it would make sense for private vehicles. But what about jets?" He was, quite naturally, wondering about the Hawks he loved to fly. Would the same ploy, if it ever became necessary, work for him?

She shook her head. "Probably not. They would need some control in the air, wouldn't they? In case of accident." She paused while she unwrapped her sandwich and took a bite. He followed suit, first setting the chip on the table between them. Then she said, "Of course! The Chickadee! They can't possibly turn off the same way."

He made a disappointed face. She laughed around a mouthful of sandwich, but then she choked the sound off abruptly. He looked at her curiously, and in a moment she said, "Your colleague came by the house this morning. She wanted the dope on the Mack attack."

"Connie?" he asked.

She nodded. "She also laid some heavy hints on my husband."

He winced.

She reached out one hand to touch his wrist. "I don't believe you'd brag about your women, Bernie. But . . . "

He sighed. "Yeah. We've been pretty close."

"So she wants you for herself. She's jealous."

"So's Nick," he said.

She reached out one finger to touch the chip. "Would she . . . ?"

"No." He hesitated. "She'd probably try for me." He set down his sand-

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wich, sipped his coffee, and picked up the chip. "And not this way. I'm willing to bet that when I take this down to the university, Narabekian will say it's set to activate on the expressway, and then watch the traffic until just the right situation comes up. Those 'hunting' motions you noticed. It was looking for gaps in the traffic, and maybe an oncoming truck. When it found them, it moved left, and . . . "

She shuddered.

"Whoever we're looking for, he doesn't care about bystanders. Your response was perfect, and just in time," he said. "But you were still lucky."

"Very lucky," she agreed.

"He couldn't have known . . . " He stopped suddenly.

"Not Nick," she said softly.

"Of course not," he murmured gently.

She stared at the sandwich in her hand. She nibbled at a bit of meat that stuck out between the halves of bun. "He's suspicious," she finally said. "But only partly because of Connie. He thinks I'm seeing you too much. More than the investigation calls for."

"Let him." Had he been behind the call to headquarters? The one that accused him of chasing skirts when he should be chasing murderers and rapists? "Grown-ups have a right to have friends of their own. Even outside marriage. Even bed-type friends."

She set her food down and clenched her hands together, staring at them. "But not in secret," she said. A tear glistened on the lashes of her right eye. She looked up, her gaze meeting his squarely. "That's not fair. It's dirty."

"You feel guilty."

She nodded, her eyes still meeting his. "And we really shouldn't keep it up." She shook her head, so hard that her hair swung wildly. "We're not, we're not, really compatible. Are we?" The tear was back in her eye, and her broad lips were pinched with pain.

She was right, of course. Connie was much more his type. But . . . "What do you mean?"

"I thought you were sensitive. You are. But you also have a cruel streak. I saw it with Ralph's Armadon first. Then the Mack. Now you say you would just have shot my Tortoise. Nick's Tortoise."

He could have left the Armadon to Chowdhury's own tender graces. And she had shown him what else was possible with the Tortoise. "What else could I have done with the Mack?"

Her hair flew again. "That's not the point. You're like that Hawk you fly. Bloody-minded. A predator."

He sighed and looked away from her, fingering the chip. "You're right. I even think of myself that way."

"And I prefer a gentler man."

"Like Nick." Now he knew who she was wishing would walk down the hall.

"Like Nick."

When Bernie had arrived at Neoform, he had been pleased to find a parking space for his Hawk beside Emily's Tortoise. The genimals cared nothing for each other, unless his Hawk might look upon a shelled reptile as food. He didn't think it would. It was crows, wasn't it? Or ravens? Whatever. He once had heard of a bird that carried turtles aloft and dropped them on rocks, as seagulls did with clams.

He had, however, enough of a ro-

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mantic streak to wish that their genimals might, like their riders, at least enjoy each other's company. At the same time, he was practical enough not to forget that the other vehicles in the lot might seem to be more tasty fare.

Laughing at himself, enjoying the sparkle of sunlight on the water flowing in the trough between the rows of genimals, the small puffs of cloud overhead, even the scent of dung, he had given his Hawk and Emily's Tortoise a moment in which to recognize each other. Then he had laughed, admitted that in truth they barely seemed to notice, and toggled the Hawk into dormancy. As he had walked toward Neoform's entrance and his appointment with Emily—his date, he had felt, with his mind on what might come, once more, after lunch—he had told himself that surely he fooled himself just as much by insisting whenever possible on the same Hawk. It never recognized him, or if it did it did not care.

Now, telling himself that perhaps the Hawk had known better than he all along, he climbed aboard again, awakened the Hawk, and strapped himself into his seat. Carefully, he looked for tampering or intrusion, and then he laughed at himself. Emily's Tortoise had been sabotaged. Now he was wondering about his Hawk. He reached forward and gave the panel that hid the control computer a tug. When it popped loose, he tunked it back. It was enough, for now, to know that the panel was not locked or jammed in place. He could, if that action became suddenly necessary, yank it free, find the mother board, and remove the foreign chip. There should be no problem, for gengineered aircraft could continue to function without the carrier signal from their computers. If, for some reason, Emily's conclusion on the matter proved faulty and the Hawk froze up as had the Tortoise, well, he would still be high in the air. He would have plenty of time to repair the problem while the Hawk fell.

Still, he was not sure. He checked the Hawk's pod again, and again he saw no signs of trouble. He felt the edges of his seat and, yes, there was the button that would eject him from the pod if necessary. There was a parachute beneath the seat that would lower him, seat and all, safely to the ground. But there was no piece of paper that offered him a guarantee of long life and happiness. There never was.

He manipulated the controls. The Hawk spread its wings for takeoff. The engine roared, pressing him back into his seat, and the bird leaped into the air. The wings tipped, warping its flight into a climbing spiral, and the Neoform buildings diminished below, shrinking to the incongruity of a child's playroom. A modern office building set beside a farmer's red and white barns, the bulging blue and yellow stripes of a fabric dome, all among white fences and green paddocks surrounded by city streets, stores, and tracts of homes.

Bernie looked toward the city center, now ahead, now leftward, now rightward. His office and the Aerie were there. His apartment. Connie. She might be jealous, but she *was* a cop. A predator herself. Like him, a hawk. He wondered if she would be free for the evening.

With one hand on the steering yoke, he bent the Hawk's course toward the

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Aerie. It rolled, throwing him against the straps of his seatbelt. Had he oversteered? A gust of wind? It rolled again, pitching abruptly to the right and back again. He felt the pod in which he sat slip against the Hawk's back, and adrenaline surged through his system. His pulse raced. His palms grew damp and his mouth dry.

The sensation was familiar. He felt it anew every time he faced a criminal. He had felt it when the Mack had been bearing down on him and Emily. He was sure she had felt it when her Tortoise had headed for the median.

He eased up on the throttle and jerked at the yoke. For a moment, he thought he had solved the problem, whatever it was. But then the Hawk pitched forward, back again, from side to side. He could feel the movements of his pod and the strain on the straps. Those straps were heavy. They were strong enough for all foreseeable strains. They had to be. But they could not possibly be infinitely strong. They could be broken.

Or torn. He was reaching for the computer cabinet, the truth having penetrated that his Hawk had indeed been sabotaged. Emily had rejected him, but still he could learn from her. But before he could open the panel, much less remove the mother board or cleanse it of its parasitic infection, the Hawk pitched into a forward roll, like a diver from a board. It bent, and it tore at its breast with its great hooked beak.

Bernie seized the yoke. It was, he knew, too late to remedy matters in Emily's way. If he let go, the Hawk's gyrations would slam him back and forth against the straps that held him in his seat. He would not have the stability, the steadiness, he would need to pop the panel, find the board, and remove the chip that was surely there. But, he thought, it didn't matter. The Hawk would shortly sever the straps that held the pod to its back, just as it and its fellows had severed the Sparrow's straps. And the saboteur's influence would have to end.

He hung on, while the Hawk's gyrations spun the blood to his head and his vision darkened. He barely noticed when his bladder let go. His face distorted into a rictal grin, but that grim expression was due only partly to the gee forces he was experiencing. He too, he told himself, was a hawk. He would survive. He would triumph.

The straps gave way. The pod leaped from the Hawk, its tangent course quickly curving into a parabolic plummeting toward the ground. Bernie grunted relief at the sensation of free fall, but his rictus remained.

He pressed the ejection button. Explosive charges shattered the clear shell of the pod and propelled his seat and him into space. Wind struck his face. He tumbled, and nausea flooded his stomach. When he faced the ground he saw that he was above a residential neighborhood, one of those with grass-paved streets. The wreckage of his pod was tumbling slantwise, pushed by wind, toward a schoolyard. He thanked God that it was summer, school was out, there would be no kids at recess. Then, realizing, remembering his own childhood, he prayed that none of the neighborhood children would be on the playground anyway.

He extended his arms and legs to slow the tumble and let air pressure stabilize

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his position. He looked for the Hawk, afraid that now it would see him as prey on the wing and . . .

And "Eee kai vai!" There it was, screaming its siren call, already stooping toward him, and the favorite curse of the few Franco-Americans among his childhood playmates sprang to his lips. "He! Calvaire!" or "Oh! Calvary!" He had not thought of that in decades. He wished he, too, believed. He crossed himself anyway, just as those playmates always had in moments of stress.

His magnum was, as always, under his arm. He fumbled, cursing the seat straps that got in his way, and drew it. He aimed and fired, and the recoil renewed his spin, but not before he saw the Hawk shy off.

The Hawk swooped past him while he spun. It screamed. It climbed. By the time he had himself stabilized once more, the Hawk was attacking again. He fired, missed, and spun. Frantically, he squeezed off another shot as soon as he swung into position anew, and again, and again.

The Hawk's scream stopped. Bernie felt a buffet of air at his back, and then the Hawk, his Hawk, his soaring, swooping, stooping steed of air, was falling past him, already tumbling. Less dense than the pod, offering more surface area to the wind, it would strike the ground well past the playground.

Once more he stabilized his fall, and then he felt for the D-ring that would activate his parachute. He pulled it, knowing that the wind would carry him much farther than it did the pod or Hawk. He might never see either again, or until he visited them in the warehouse, surely the same one that had held the Mack, to retrieve the chip, the evidence of sabotage.

In a moment, the chute yanked at his seat. His straps yanked at him, squeezing his chest and stomach. He began to sway, and it was all too much. He vomited.

Chapter Seventeen

The Count, Lieutenant Napoleon Alexander, was a martinet with delusions of grandeur, but he did care about his people. Bernie had to give him that: just as soon as the word reached headquarters, the Count himself would come to pick up the pieces.

Bernie wished it would do him some good.

He knew how to land, but only when his legs were free, not when he was strapped to a massive, stinking pilot's throne, unable to cushion the blow on bent knees, or to roll. All he could do was grit his teeth, ignoring their taste, and clutch the arms of his seat, his gorge convulsing at the touch of what his stomach had expelled. The wind of his fall buffeted his face and chilled his soaking legs.

He waited, staring alternately at the rapidly nearing ground and the canopy of nylon that billowed above his head, thinking that the Hawk had cheated. It had kept on attacking even after the loss of the pod had broken all connection with the saboteur's subverting chip. Was it because the new programming had somehow taken root in the genimal's brain? Had the chip simply activated reflexes that had to run their course? Had it seen him, tumbling in the air, as irresistible prey? Or did it

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hate its masters and seize its opportunity for vengeance?

When the impact came, he felt it in his butt, jarring up his spine. His teeth bounced apart, despite his clenched jaw muscles, and whammed together again. His vision blanked.

When his eyes agreed to work again, they showed him a broad expanse of green, a lawn splashed with color, trees onto which the chute canopy was settling. There was a house to one side. He tried to blink the daze out of his eyes as he looked closer, and he realized: he was neatly embedded in a cluster of thorny rosebushes. Their pale pink blooms nodded away from him on stems bent by his presence. He assumed they had the fragrance typical of roses, but at the moment his nose was as stunned as his butt.

He untangled himself from his seat straps and the cords that had suspended him beneath the parachute. He struggled free of the rose thorns, swearing. He tugged the chute out of the trees beside the lawn, used it to wipe his hands, face, and shirt clean, and wadded it up. Then he yanked the seat out of the roses and weighted the chute down.

Finally, he turned toward the house. It was a green cylinder rounded on the ends, with small windows studding its low length. "A goddamn zucchini," he said aloud. Except for the color, it reminded him of the antique Airstream trailers that still, from time to time, queued up to tour the countryside and the pages of travel magazines.

A young woman clad in a skimpy bathing suit leaned on the railing of the house's central porch. A screen door stood ajar behind her. A gaily striped towel, one corner rucked up where a parachute cord had brushed it, marked where she had been sunbathing. A glass lay on its side beside the towel, as if she had knocked it over. Perhaps, he thought, she had heard the Hawk scream, looked up, seen the fight and its end, and then run for the house to get out of the way of falling objects.

"I saw it all," she said. "Wow! Do they do that often?"

Bernie shook his head. He was still dazed. "It keeps the job interesting," he managed. "Got a phone?"

"I called already." She waved a hand toward the street and the other houses of the neighborhood. "So did they, I guess." He turned to look. A dozen people—men, women, and small children—were standing there, carefully staying off the lawn, not approaching, perhaps wondering whether there would be more gunfire. Two dogs stood spraddle-legged, howling their defiance of his invasion of their turf. A few other people were trotting purposefully down the greenway, away from him. He was still too disoriented to know which way was toward the city center, or where his Hawk had come down. He presumed they knew just where to look.

Sirens echoed across the sky and down the nearby streets. Four Hawks swept into view and stooped, two toward him, two beyond the trees. A Pigeon ambulance howled into view, and half a dozen Roachsters rattled to a stop by the curb.

The Count was in the first of the Hawks to land. He tumbled from the pod, tripping on the edge of its hatch, catching himself, running toward Bernie, his dignity forgotten for the mo-

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ment. "Bernie! You're OK! What happened?"

Briefly, he told the tale, while the woman on the porch listened and his fellow officers—Larry Randecker was one of them—shooed the bystanders away. "Find the computer," he concluded. "There'll be another of those goddamn chips in it."

The Count gripped Bernie's biceps with one hand and gestured with the other. "That's what they're looking for," he said. "Don't need a cargo hauler for a Hawk. They've got nets."

"Did you bring a body bag for me?"

Lieutenant Napoleon Alexander looked uncomfortable. After a moment's hesitation, he said, "We didn't know what to expect, so . . . "

Bernie laughed. "So you did!" Then: "Where's Connie?"

"We couldn't be sure, but she was afraid it was you. She wouldn't come."

"Excuse me?" Larry Randecker clapped Bernie on the back, but he was speaking to the Count. "We've got a veedo reporter."

"Tell him we'll have the story later. At headquarters." He sniffed at Bernie, then at the crumpled chute. He wrinkled his nose as if to say they both stank. They did, though most of the obvious mess was now embedded in the chute's fabric. "Maybe we should put the chute in the bag. But come on." He led Bernie toward the waiting Hawk, one free of sabotage, well behaved, normal, safe.

"I didn't dare." Bernie had showered and changed his uniform for a set of overalls belonging to one of the Hawk handlers. When he emerged from the Aerie's locker room, Connie was there, seizing him in arms like steel bands, laying her head on his chest, saying, "I just didn't dare go out there. If I had had to help shovel you into a bag. . . . " She choked on tears, and he struggled not to pat her on the back. Instead, he squeezed her as hard as she was squeezing him.

"Come on," said the Count. "They've got it all, and . . . " Both of them followed, their arms around each other's waists, as he led the way out of the Aerie, across the yard, and down the street toward the warehouse. No one worried that they were not upholding the proper image of a police force.

The warehouse was as gloomy as ever, its lights as dim, its walls as darkly shadowed. Bernie's Hawk lay where the Mack once had been, and the department's butchers labored over it. The meat was fresh this time, and there was no need of delay for inspection. They were reducing the carcass to slabs of meat for the Aerie's genimals. Probably, Bernie thought, some of it would find its way into the cafeteria.

The wreckage of the pod lay in a pile to one side, set off by a line of official sawhorses from the residue of the Mack's debris. "Looks like you needed a shovel," said Bernie. He let go of Connie when she tugged at his arm. He watched as she approached the butchers' area and retrieved a tail feather.

"Damn near," answered a young technician. She stirred a mass of small, black fragments. It looked like a pile of dead beetles. "The composition board material shattered. These are all the chips we could find."

Bernie knelt and sifted through the pile with his fingers. Each chip—or

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rather, its epoxy, contact-legged housing—was intact, and its code numbers were legible. But he could not recall the numbers that had identified the PROM chips the saboteur had used. He had no hope of finding the evidence he craved, not unless he trekked back to the office. He did not feel like exerting himself when he was so certain of the result.

Another technician opened a case. "Intact boards from a Hawk controller," he said. "A full set."

Connie returned, carrying the feather over her shoulder as if she were a carpenter lugging a board. She murmured, "A souvenir," and took Bernie's hand. Then, while she, Bernie, and the Count watched, the two technicians carefully matched each of the loose chips to those mounted on the boards. In ten minutes, there were just two chips on the boards for which they had not found matches, and they had one loose chip that did not correspond to either one of them. Wordlessly, one held it up to Bernie. He accepted it, studied it, and thought the numbers looked familiar. Finally, he nodded. "I'll check it against the others. But, yes. This has to be it."

"What now?" asked Connie.

"Back to Neoform," he said. "It had to be put in while I was there this morning. So whoever it is . . . "

"But how will you find him?"

Bernie looked at Connie until she blushed lightly. "Or her," he said at last. "They keep good sign-out records."

"Want a Roachster this time?" offered the Count.

Bernie shook his head. "I'll be brave. I'll stick with Hawks. Just make sure it's got a good chute."

* * *

He had arrived there before lunch and stayed through the lunch hour, Bernie told himself. Surely no one would have dared to tamper with the Hawk while Neoform's people had been passing through the parking lot on their way to their favorite restaurants. But there had been a little time before lunch, and then a little more when the lot had certainly been quiet, waiting for the return flow of people and their genimal vehicles.

He had checked the chip. It had indeed been identical to the others. He knew, without looking, exactly how it had been programmed. Later, before the case came to trial, if it ever did, he would have to see Narabekian for confirmation. On both chips, his and Emily's. But he had no doubts. The *modus operandi* was far too clear.

The new Hawk was banking obediently to circle above the Neoform estate. There was no hint of sabotage, not the least suggestion that someone had plugged some subversive hidden program into the beast's circuit boards, waiting for its first chance to get him. Bernie grinned mirthlessly. He hoped the sonuvabitch would try. The afternoon was winding down—it was after four already—and he could see that the Neoform parking lot was already emptying. He would land in a vacant area—that one, there, to the right, not too far from the building's entrance—and leave the Hawk awake, not toggled down.

The bird's head was up, cocked now this way to look at clouds above its head, now that way to watch the traffic on the road that bordered the parking lot on two sides, now peering at geni-

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mals beyond its reach, now at people leaving the building, now at Bernie as he approached the entrance. Bernie felt confident that, this time, he was safe. If anyone approached the Hawk without him, there would be no need for a trial. He had come too near needing a body bag himself. This Hawk would leave so little that a baggie would be enough.

Neoform employees were trickling past the reception desk, pausing to scrawl their names on the sign-out pad. A woman as grey-haired as Miss Carol stood behind the receptionist. Bernie, presuming she held down the evening shift, ignored her as he leaned over the counter that separated her from visitors. "Miss Carol . . . "

"I just called her. She's coming down."

He shook his head. "That's not what I'm here for. I need to see the sign-in and sign-out records for earlier today."

Her eyebrows rose. "You can't do that!"

He sighed. "I can get a warrant if I have to. Someone here sabotaged my Hawk this noon, and I want to see who had the chance."

"But that will take hours!"

"I doubt it," he said.

"And besides . . . " She glanced at a clockface set in her console, and then at her replacement, who simply shrugged and said, "I'll go get a cuppa."

Emily arrived as the other woman left. She looked puzzled, but Bernie quickly explained what had happened. When she said, "Oh, no!" and put a hand to her mouth, he flapped a hand. "I'm all right," he said. "There was a moment there when I was saying good-bye to my descendants, but . . . " He shrugged and said what he was after.

When Miss Carol objected once more, Emily said, "There shouldn't be any problem. It's on the computer." She moved behind the receptionist and pointed to a slot in the side of her computer terminal. The printer was built in. "And it shouldn't take very long to get a printout."

It didn't. Though she grumbled as she worked her keyboard, Miss Carol was able, within minutes, to elicit a list, two single-spaced pages long, of all those who had signed in or out between 11:00 A.M. and 1:00 P.M. Beside each name was the time that person had left the building and the time he or she had returned.

"Thank you," said Bernie.

"You can look it over in the lab," said Emily.

They were alone in the lab. Alan Bryant was gone. The broad screens of the workstations were dark. "I *was* about to leave," said Emily. She led him across the lab to a bench with more clear space than most. When she reached it, she pulled out a chair for him. Then she kept moving, circling the bench until, safely untouchable, she could face him from its other side.

Within himself, Bernie winced. So short a time ago . . . "Sorry," he said, and he was, for everything. "It shouldn't take very long. But it can't wait."

"Why on earth not?" As if despite herself, Emily leaned forward over the bench. Her blouse gaped, and he deliberately kept his gaze on the sheets of paper in his hand.

"Because it's the first solid clue

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we've got." He pushed aside the few pieces of workaday clutter that occupied even a relatively clean bench. Then he spread out the pages of the computer's printout. "Whoever planted that chip had to do it when the Hawk was here. They couldn't have done it at headquarters."

She pulled back, found a seat at another bench, pulled it into position, and sat down. "Couldn't they have done it on an earlier visit?"

He shook his head. "Too unreliable. I don't always have the same Hawk. I try, but . . . "

He leaned over the papers, scanning. He cursed when he realized that the names were in alphabetical order. "I wish it had listed folks in the order in which they signed out."

It was her turn to apologize. "I should have realized."

He found his own name. "Here," he said, handing her a page. "Cross out everyone who left before 11:23 A.M. or after 12:47 P.M." He did the same on the page he had retained. Those were his times, and they bracketed the vulnerable period. No one here could possibly have sabotaged the Hawk before he arrived. And the deed had been done before he left.

Together, they studied the names that remained. One had "returned" before she left. "On vacation," said Emily. "She comes in for her mail." Most of the rest clustered near twelve noon. Only one left after 12:15, and that one signed out at 12:20 and back in at 12:29. A delay, perhaps, to allow the parking lot to clear, and then just enough time out of the building to do the job.

Bernie sighed in satisfaction. "The only one." He pointed at the name on the sheet of paper, the damning numbers beside it. "The only one who had a chance. I was afraid there would be more. Or that he would be cleverer."

Emily stared at the page. "But why him?"

Bernie shook his head. "I don't know. But at that party, he asked about attempts on your life." When she looked puzzled at the significance of that clue, he explained: "Attempts. Plural. More than one. And at that time, there had been only one that we knew of, the Assassin bird. No one suspected the Sparrow had been aimed at you. That's when he became a suspect."

"But . . . " Her eyes widened, as if even now it were inconceivable that anyone would really want to kill her. "But why?"

He picked up the printout, folded it, stuck it in his shirt pocket, and shrugged. "Rivalry, perhaps. Or part of his general mad-on for everyone in sight. You told me about that. Or maybe . . . " He hesitated.

"What?"

It had occurred to him that if Chowdhury was truly capable of trying to kill Emily, and of doing so with no regard for hapless bystanders, he might well be capable of other evils. And he lived, he had told Bernie at the party, not too far from the Gelarean place. That put him in or near Greenacres. He might have been the one who had treated Jasmine Willison so poorly.

Bernie said nothing to Emily about his suddenly added suspicion. It might be sheer coincidence. There was nothing except his personality that made him think the man was even capable of such

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an act. But if she met the man before Bernie could gather the final shreds of evidence and make the arrest, her reaction to him, involuntary though it would be, might give away too much.

In fact, he regretted what he had said already. But that was done, past changing, and he would have to make the best of whatever came next.

"He must be scared," she said. "He left no tracks before, but now . . . "

"I've been around too much," said Bernie. "He must have thought our affair . . . " She winced when he said the word, and he hesitated. "Our affair was just a blind, while I snuck up on him. Of course he's scared. They always are, and when they panic, that's when they slip. And we get them." It was, he thought, a cliché right out of centuries of detective stories.

"What next?" She licked those broad lips, and Bernie looked away.

"I'll need to get a pair of search warrants. Then, tomorrow, I'll go over his lab and his apartment. Wherever I find him, I'll arrest him. And you'll be safe." And back with Nick, he told himself.

"Can I go with you?" She stood and began to edge, crabwise, toward the end of the bench. The distance between them increased, but Bernie realized that, really, she was drawing closer to him, diminishing the length of the perimeter between them. He held his breath for a moment, though he knew he was being an idiot. She was Nick's. He was, he knew it now, Connie's.

Would she be safe with him? Taking her would not at all resemble standard operating procedure for a cop nailing a suspect. But she was certainly concerned, and he did still feel something—more than *something*—for her. "Why not?"

Chapter Eighteen

A little after Emily had left the house that morning, Nick had busied himself with doing laundry in the basement. He had left Andy in the living room with the veedo running and his plastic Warbirds within reach.

Emily denied it, but he was sure she had a yen for that cop. Maybe more. He wouldn't be surprised if she actually had something going with him. He had, after all, seen her face when Connie Skoglund had asked her last question. And if she didn't, or hadn't, she wouldn't have said she wasn't about to walk. But she *wasn't* about to. She said so.

He sorted the clothes, thinking. The cop was lucky. Two women. That Connie wanted him, too. Which one did *he* want? Lucky bastard.

Or was he? Was he, Nick, luckier than he thought? Bernie could have Connie, she had made that clear. But not Emily, after all. She had said she wasn't leaving.

Nick grinned at the sense of relief that rushed over him. She loved him. She must. And he loved her. He always had, he always would. He should tell her so, now.

He set dials, pushed buttons, and waited a moment while the machine began its noisy labors. Then he went upstairs and checked on Andy, who had folded a throw rug into a mountain range and poised his Warbirds on the edge of the couch. He was launching the 'Birds one by one to strafe and bomb the range while invisible ground forces strove to

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shoot them down. At the end of each run, the Warbird would scream, roll, and crash noisily before returning to the couch.

The phone was in the kitchen. He punched the Neoform number, got the receptionist, and asked for Emily. The answer startled him: "Oh, Mr. Gilman! She's in a meeting right now, but she's all right. Really, she is!"

For a moment, he could not speak. Why shouldn't she be all right? He was happy that she was, of course, but . . . but . . . He almost shouted the words: "What happened, Miss Carol?"

"I don't know the details," she said. A "yet" seemed to linger behind the words. "I'm sure she'll tell you all about it later on. But she *is* all right!"

He hesitated once more, as uncertain as he had ever been of what to do. Finally, he said simply, "Tell her I love her."

"Of course you do!"

"What's the matter, Daddy?" Andy was at his knee, looking up, eyes wide, drawn inevitably by the tone of panic in his voice. "Did something happen to Mommy?"

Nick shook his head. "She's all right," he said, straining to sound normal, hoping that was the whole truth. "Want to go for a ride?"

"Yeah!" The boy grinned. "But Mommy's got the Tortoise."

"So we'll take the bus."

"The airport?"

"Why not?"

Nick and Andy were soon on the route to the airport, and Nick was saying, "The bus may not stop, you know. The airport's closed."

But the bulldog-based bus did grunt to a halt at the airport. Nick was surprised to see construction crews at work, tearing down hangars and sheds and tending fast-growing squash vines. The young fruit, already visible, were long and thin, like zuccinis, and their upper, sun-fading surfaces were a translucent yellow.

Father and son left the bus and walked past the small, obviously abandoned terminal building. Nick pointed out the bioform bulldozers, enlarged box turtles whose shells had been modified to serve as earth-moving blades; the Cranes that positioned the young squash next to their foundation cradles on the runways; the antique Mercedes parked, a gleaming, maroon intrusion from another age, behind the terminal. Beside it stood a trio of lean, black-suited, hard-eyed men.

They saw Nick and Andy as soon as they rounded the building. The youngest of the three turned, smiled stiffly, and said, "What are you doing here?"

"Just looking." Nick was suddenly cautious. He put a hand on his son's shoulder and held him close. "There used to be an airport here."

"Yeah. The boss bought it when it went bust."

"The boss?"

The other's eyes narrowed, as if Nick were being too inquisitive. "Florin. *Greg* Florin."

The name meant nothing to Nick. He shrugged. "What's it going to be now?"

The man sighed. "A farm." He gestured at the growing squashes. "Greenhouses. And aquaculture tanks. Barns. They figure it'll be close to the market, you know?"

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Andy's mouth hung open. "Can we come back later? I wanta see everything!"

The other laughed, a short bark that cut off as if it were against the rules to be amused by anything at all. At the sound, the oldest of the supervisors swung around. He wore a pencil-line mustache, and his hair was greying neatly along the sides. He said, "This is private property, kid. Get lost. And tell your father it ain't smart to ask too many questions."

Andy's mouth had still hung open, but no longer with delight. Nick had stifled words that surely would have been unwise to speak aloud, considering the way the strangers had carried themselves. He had turned the boy away, back toward the airport bus stop, and they had left immediately.

Once safely on the bus and heading home, Andy had wanted to know, "Why, Daddy? Why were they so mean?" Nick could only shake his head.

Andy was still upset about the rebuff he had suffered when it was time for Emily to arrive home. Nick was in the kitchen. The boy was in the living room, making his Warbirds use their laser cannons, fléchette bombs, and poison sprays to clear obstacles from some imaginary airport's runways.

Nick could not help but be amused. If only adults could use their fantasies in the same way! Some could, he knew. But most, most thought that fantasy was for kids. For grown-ups, its only justification was as planning for the real thing.

"Where's Mommy?" The cry seemed plaintive. When Nick checked the clock on the wall, he realized that she had not pulled the Tortoise into the garage on schedule. She was late. He left the makings of dinner scattered on the counter and joined Andy in the living room.

By the time Emily did get home, father and son had been standing by the window overlooking the drive for twenty minutes. Nick, remembering how Miss Carol had alarmed him with her reassurances, had said nothing aloud. He had simply joined the vigil and let the boy lean against his leg.

When Emily finally walked into the house, she was obviously tired. She slumped, and her hair needed the touch of a comb, but her voice was lively as she said, "You wouldn't believe . . . !"

She threw her briefcase toward the couch and opened her arms. Nick held her tight. "Try me," he said. When Andy tried to push between them, he let her go long enough to reach down and lift the boy into his arms. Emily kissed their son.

In a moment, she looked at Nick curiously. He told her about calling, and what he had wanted to say. She kissed him and said, "It was the Tortoise."

"What happened?"

She explained, accepted his congratulations and hug, and let him lead the way to the kitchen. "Dinner's on hold," he said. "And the wine . . . "

Nick set Andy down on the counter beside the sink. They fetched the wine, poured, and positioned themselves on either side of the boy. She said, "But that wasn't all. Bernie's Hawk had a chip, too, and it went berserk in the air. He had to shoot it."

"I'll bet he had a parachute!" said Andy. She nodded and squeezed his

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shoulder. Thus encouraged, and reminded of the death of the Chickadee, he said, "We went to the airport today. And it's gonna be a farm! But they chased us away."

She let him interrupt. When the story ran down, she squeezed his shoulder again and returned her attention to her husband. "And then Bernie had to check the computer at work. That's why I'm late. He didn't even get there till almost five." They clicked their glasses in a silent toast to survival. She went on: "The saboteur made a mistake. He left tracks." She explained how Neoform's people signed in and out, and how that procedure had let them identify the guilty man.

Andy tugged at his mother's blouse. "Who was it?"

"I don't think you've met him, dear. I hope you haven't." She looked at Nick. "Chowdhury."

"The chowderhead." He said that natural corruption of the name as if it were a curse.

"We'll get him tomorrow. Bernie's getting the warrants tonight." She hesitated before adding: "I'll be going with him. He said it would be OK."

"Can I go, too?"

They each put a hand on Andy's knee. "Uh-uh." Nick's smile, so confident that he loved her and that she loved him, that she was his and not this other man's, slipped. It became a frown, and then a scowl. He said, "I'm not surprised you want to be there. But . . . "

She straightened and drew back from him, just a little, as if chiding him for his suspicions. "He almost killed me, Nick!"

"And *he's* your protector."

"That's what I called him this morning. It's true. And I'm certainly concerned with this case. I want to be in at the end." She tossed back her wine, lifted her butt away from the counter, and stepped to the fridge to refill her glass.

He watched her move, thinking of the past. There had been a time when his thoughts had centered on that butt, her body, for hours and days at a time. He had prized as well her intelligence, her independence, her determination, her drive. He was getting old. The body still drew him. But the rest of her, the mind and spirit, seemed more important. There were plenty of bodies in the world. The rest . . . ? He did not want to lose her.

She held up the wine carton and cast a quizzical eye in his direction. He nodded, emptied his glass, and held it out. She poured, a wing of dark hair falling past her cheek.

He sighed. What did Bernie value in her? Mind? Spirit? Body? Or even less? Was she, perhaps, only a momentary focus of attention, attractive because she was part of a case, there, ready to his hand?

She spoke: "That's all he is, you know. There might have b—" She stopped herself with a visible effort. "He's not really my type."

His voice was gentle. "What do you mean?"

"He's a man," she said. "He even smells like one." Her eyes half closed and she smiled softly, while Nick wondered whether he should feel insulted. "But he has a mean streak." She told

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him what she meant. "He's not gentle. Like you."

Andy was watching them carefully, head turning, first right, then left, to face them as they spoke. "Daddy's nice," he said. "Isn't he?"

Emily wrapped one arm around the boy's shoulders. "We want you to grow up to be just as nice," she said.

He wiggled under her arm and said, "I'm hungry."

Nick laughed. "Then I'll get supper back on track."

When Emily fell asleep on the couch after supper, Andy said, "That's funny, Daddy. Mommy never takes naps."

"She had a hard day," his father told him. "The Tortoise . . . "

"Why did it try to kill her?"

"Someone told it to."

"I know. He reprogrammed the computer."

He nodded. "Sort of. But she fixed it in time."

"Then it's OK now?"

"For sure. No problems. And right now, it's time for you to head for bed." He reached as if to swat a young behind, and the boy laughed, dodged, and ran for his room to change into his pajamas.

Nick let his wife sleep. She *had* had a hard day. It wasn't the first, what with the Sparrow, the Assassin, and the Mack attacks, but this one must have been the worst of them all. Their own possession, the Turtle, always and unquestionably trustworthy, had turned on her. She had won the battle, but surely the stress had been far worse than the less traitorous attacks of strange genimals could ever engender. And then the discovery of who had done it, the resolution, the relief of suspense, the letdown. He told himself that he, too, would collapse under the circumstances.

She did not wake until, near their normal bedtime, he decided to move her to their bed. As he slipped his arms under her and lifted, her eyes opened and one arm went around his neck. "Honeymoon time?" she murmured.

"Bedtime," he said, smiling down at her.

"Hokay," she drawled. Her arm tightened to draw his lips to hers. "But can I wash up first?"

"You smell fine."

"So do you." She kissed him again. "But I still want to wash up."

Chapter Nineteen

Morning sunlight poured through the broad windows of Sean Gelarean's spacious office. The walls, panelled with Honduran mahogany, were splashed with original landscapes. A sideboard held three of Wilma Atkinson's biosculptures. The cooled and filtered air smelled faintly of polishes for wood and leather, of lime aftershave, and of potting soil.

Gelarean himself sat at the broad desk in a high-backed seat of padded leather. His face was dark in silhouette against the window behind him. A single unmarked pad of paper was centered before him, a pen beside it. A computer screen and keyboard rose out of the desktop at a comfortable angle. A phone was pushed to one side to make room for a glistening rectangle with rounded corners. The strange object's surface was a mottled green. In the center of its top was a ring of eight eyes. Near each

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edge was a mouthlike slit. No legs were visible.

The desk was a slab of wood that, at first glance, seemed to float in air. Then the watcher realized that Gelarean was visible only from the desktop up, the rest cut off as if by a knife, or blocked as if by a solid desk. The desktop's apparent defiance of gravity was an illusion: the desk had supporting sides like any normal desk, though they were holographic veedo screens that faithfully repeated the view of rug, wall, and window behind them. It was as close as technology had ever come to invisibility.

Bernie stood before the desk, thinking that Gelarean was just the company's head of research. What sort of quarters did Neoform's president enjoy? Could the difference be as simple as thicker carpeting and more expensive panelling?

"A warrant," Gelarean was saying. He held the paper before his face, reading. "For today, Friday. But why?"

The briefcase from which Bernie had taken the warrant still hung from one hand. He lifted it six inches and let it fall. Carefully, as if Gelarean were totally ignorant, he explained: Someone had been sabotaging genimals, apparently trying to kill Dr. Gilman. There had been the Sparrow, the Mack, the Tortoise. And, of course, the Assassin bird, which underlined the seriousness of the criminal's intent, and the fact that Emily was indeed the target. The target image in the Mack's chip was mere confirmation.

"But what makes you think . . . ?" Gelarean's tone was that of a businessman who had nothing at stake but face. The police were in his office, but he had done nothing wrong and could not be touched. At worst, the company might falter for loss of a key employee, while he might blush in embarassment.

"Yesterday that someone put another chip in my Hawk while it was in the lot outside." His voice had grown biting, angry. "And only one person left the building at the right time." After a moment's pause, Bernie added, "Your security system produces very good records." He did not say that there were other reasons for suspicion, too.

"Ah. Well, in that case . . . " Gelarean's seat creaked. The hand nearer the telephone twitched, as if Gelarean suddenly wished to place a call. Bernie did not miss the movement, but he did not credit it with any great significance. The reason, he later thought, was that the executive smoothly changed the motion's course to open a drawer and produce a small vial with a perforated lid. Gelarean held the vial near the green oblong on his desk and removed the lid. A fly buzzed free and circled briefly. Then one of the oblong's mouths opened, and a long, cord-like tongue flicked out to snatch the fly.

Gelarean explained: "A flytrap. We developed it from a frog to sit on a table, or hang on a wall and . . . " He flicked a finger. "It should do well in warm areas."

"On picnics, too."

The other gestured, open-palmed, toward the door to the suite. "I won't keep you. Go to it. Though I hope you're wrong. We'd hate to lose the man."

He met Emily at the door to her lab.

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"Just down the hall," she said. "I saw him come in earlier."

They faced each other, motionless, for a long moment. No, he thought, she was not for him. And she clearly still thought the same. They could enjoy their bedroom sports. They had done it. But they had nothing in common outside the bedroom.

He hooked a thumb over his shoulder. "He was playing with a flytrap when I left."

She made a face. "That was developed by one of our technicians. The patent's in *his* name."

"Let's go," he said. She turned and started walking down the hall. He fell in beside her. At first, then, he thought they were both leaning away from each other, just enough not to touch. But the rhythm of their walking fought their separation; within a few steps, their arms were brushing companionably.

Ahead of them, a door slammed open. A slight figure darted into the hall. A white lab coat hung, half on, half off, from his shoulders. A small case was in one hand.

"That's Ralph!" cried Emily as he dashed toward them.

"Stop!" When Chowdhury paid no attention, Bernie spun and grabbed. He caught a glimpse of wide, staring pupils surrounded by rings of white, a half-open mouth, drops of sweat on a dark upper lip. Then Chowdhury was twisting toward the wall. His lab coat came off in Bernie's hand, and he was past them, racing toward the stairs. The case was still in his hand.

Bernie sighed. If only they hadn't paused to chat about flytraps! Emily was already beginning to turn back to her office and the phone. "Don't bother," he said, one hand on her biceps. "He's probably past Miss Carol by now. And we'll get him later, anyway."

The door to Chowdhury's lab was still open. When they stepped in, it was to meet the stares of his three technicians, seated at two computer workstations and a DNA splicer. "He's not here," said one. "He had a phone call."

"He said he forgot an important meeting," put in another.

"He was in an awful hurry," said the third, the one woman. All three had black hair and brown skin. Hers was the brownest.

Bernie tossed the vacant labcoat on a workbench. He remembered that twitch of Gelarean's hand toward the phone. He should have realized that Chowdhury might be warned. Now it was too late. Then again, they would catch up with him soon enough. He breathed deeply. They would not be here long.

He stared around the room, struck by the differences between it and Emily's lab. He was dismayed by the high lectern at the front of the room, the stools on which the technicians sat at their higher than normal desks and benches. How could anyone in this modern age use such ancient, uncomfortable perches? He barely noticed the freezers and incubators, the potted plants that occupied the benches nearest the windows, or the aquaria and terraria near the walls. They fitted, perhaps too well, his image of a biologist's laboratory.

Emily introduced the technicians. Sam Dong, his skin, now that Bernie knew his name, actually seeming more yellow than brown, was the one at the keyboard nearest the door. Micaela Po-

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tonegra was working the splicer. Adam Chand's screen showed something that might have been a fish, or a submarine. From the ceiling hung what looked like a dried fish that had been inflated like a balloon.

They rose from their seats and gathered near Chowdhury's lectern. When Bernie showed them the warrant, Micaela sighed. "It had to come," she said. She led them to a bench in a shadowed corner of the room. It bore a row of terraria whose contents were only dimly visible. She pressed a switch. An overhead light came on to reveal a churning mass of . . . of what? They looked like worms in size and shape, but they were banded in bright colors.

"Coral snakes," said Micaela. "There's heroin in the venom. He had me implant the genes. I didn't know what they were until—"

Sam Dong said, "I knew. He had me make some changes in them and I looked them up. I didn't tell her."

Bernie moved to peer into another terrarium, deliberately ignoring the other man's attempt to defend his colleague. "Rattlesnakes," Micaela said. "Amphetamines." She pointed. "Mambas. Asps. Mescaline and angel dust." All three technicians looked awkward, pained, embarrassed.

"The classics," Bernie said. His voice was quiet, depressed. There was no crime in giving a genimal the ability to manufacture drugs, though the law would certainly cover selling those genimals to drug users. And surely the Bioform Regulatory Administration would object to the potential environmental impact. No wonder, he thought, that Chowdhury had sabotaged the Hawk. He must have seen Bernie's interest in Emily as a blind, his interest in the Armadon as a pretext, his continuing presence as a threat. He must have panicked. And today he hadn't dared to stay and try to bluff it out.

He opened an incubator, an upright cabinet like a stainless steel home refrigerator. It was filled with bottles of pinkish fluid and trays of small eggs. "Snake eggs," said Micaela.

He moved to another bench and touched the aquarium. "What's this?"

Adam Chand answered. "Jellyfish." He explained how they administered their drug.

Bernie bent to peer more closely. The water smelled of the sea and was full of dime-sized bells, mouths down, colored in faint pastels, trailing translucent fringes. "What's the drug?"

"We don't know. He did that one himself."

"They're so small," said Emily. "They can't give much of a dose."

"Just babies. He's kept us busy cloning the snakes. He said we could stop as soon as there were enough to handle the reproduction on their own. Like the jellyfish. They lay eggs. By the thousands."

"We think . . . " Sam Dong pointed at the aquarium, hesitating over the words. "We think it's a production run. As soon as they're big enough . . . " He looked away from Bernie.

Bernie stared at the three of them in turn. "Why didn't you report this?"

As one, they shrugged. "He's the boss," said Micaela. "And he's got a temper."

Emily touched his arm. "She's right," she said. "They were surely scared."

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"I tried to mention it once," said Chang. "To Dr. Gelarean. He just told me to do what I was told." He hesitated. "And I like my job."

Bernie made an exasperated noise and moved toward the window. "And this? Nettles, by God! Did you make these, too?"

"They were his," said Dong. "Just his. The first."

Bernie shook his head. He had not expected to find all this. A design shop for hedonic genimals and shrubbery. A goddamn drug factory! The root of the new drug trade, and signs that that trade was ready to take off in new directions.

The technicians were dupes, browbeaten, intimidated into keeping quiet about their work. Surely, he told himself, they knew nothing more than what they had already told him so freely. They would be interrogated later, just in case. For now, though, could there be any clues in this lab to the destinations of all these snakes and jellyfish and nettles? Florin had to be involved, but had Chowdhury left anything to prove it?

Bernie began his search with the drawers of Chowdhury's own desk. He found small models of Armadons and other genimals, diagrams, notebooks, spec sheets, including one for the coral snake. One of the notebooks held two sketches, one of a jellyfish, the other of something he recognized as a molecular diagram. When he held it out to Emily, she studied it for a moment, her forehead wrinkled intently, before she said, "Now I remember. Heroin."

He shuddered. The snakes were bad enough. "I hope no one ever dumps one in the ocean. Can you imagine a day at the beach then?"

Micaela Potonegra scooched before a workbench at the other end of the room and pulled a cage from beneath it. It held four baby Armadons the size of kittens. As the light struck them, they began to dash frantically and noisily about. "Armadilloes," she said. "They always have identical quadruplets."

He had heard of that peculiarity. Now he crossed the room to watch the small genimals, their bodies still unmarked by doors and windows, whizzing on their wheels around the confines of their cage. They had little room and kept banging into each other.

"Aren't they supposed to have tails?" asked Emily.

"Our first ones did, but we decided they just got in the way. We took the gene out."

Bernie felt sorry for the genimals, but they had nothing to do with the case. Leaving the technicians and Emily to watch the Armadons, he returned to the lectern and opened his briefcase. Within it was a rack of disks. He selected one and plugged it into Chowdhury's terminal. It carried a sophisticated ferret program that could check every file Chowdhury had ever recorded on the machine's hard disk, as long as he had not later overwritten it, for whatever he wished. Passwords did not matter.

Chowdhury's stool was much too high for Bernie's comfort. He stood at the keyboard while he gave the program every key word he could think of—drugs, heroin, nettle, cocaine, angel dust, mescaline, asp, coral snake, rattlesnake, mamba, jellyfish, hedonic, illegal, illicit, Emily, Gilman, sabotage, Spar-

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row, Mack, Hawk, PROM, chip, Assassin . . . He paused, and then he added Jasmine, Greenacres, rape, mutilation, pumpkin, murder. Finally, he turned the ferret loose.

Emily reached past his shoulder to point at the screen. "Why those?"

"I told you about that case," he said. "Her name was Jasmine. We found her body in an empty pumpkin house in Greenacres." He paused to watch the messages the ferret was throwing onto the screen as it searched, listing clean files, saying, "Nothing . . . Nothing . . . Nothing . . . " Occasionally, it would pause to display a file name accompanied by a suspect line of text. Each time it was an internal memo that mentioned Emily as a fellow Neoform employee. Innocuous stuff, so confirmed by Emily. If he thought the file important, he could easily tell the ferret to copy it onto its own disk for later study. But he simply pressed the keyboard's spacebar, and the ferret resumed its search.

"And Chowdhury lives in that neighborhood," Bernie added.

"He's not the only one," said Emily.

"There's Gelarean," he admitted.

"And a VP or two."

The computer beeped. The ferret's mission was accomplished. It had found nothing.

"He must keep his notes on paper, or in his head," said Bernie. His voice sounded disappointed.

"Or in the computer in the barn," said Emily.

Sam Dong shook his head. "They're linked. Your ferret would have found anything there. But . . . " He paused. "He does keep a number of loose disks with him."

Bernie grunted. So that was what had been in the case Chowdhury had carried as he fled the lab. "Perfect security. He leaves no trace in the company's files, no hacker can get into them, *we* can't get into them. Does he always play things so close to his vest?"

Both Emily and Sam nodded. "He likes to pull the curtain aside all at once," said the latter.

"The fait accompli," added Emily. "I'm sure nobody knows of these snakes and jellyfish." Adam nodded, saying, "He insisted we keep them quiet."

Bernie grunted. No, Chowdhury must be developing his little wonders on the side. The nettles had already entered the underworld trade. The snakes, he thought, had not. Not yet. Not quite. And there would be no surprise announcements, no sudden unveilings.

Bernie wanted very badly to talk to Chowdhury, and he thought he knew where to find him. He would check the barn, just in case the man was saying goodbye to his Armadons. But he did not expect to find him there.

He would be home. Packing.

Chapter Twenty

The windows were curtained by strings of wooden beads. A faint odor of curry permeated the air. Wood-block prints of strange, multiarmed deities adorned the walls. Old photographs of a crowded shantytown sat, framed in lacquered bamboo, on a bookcase shelf.

The beads were a tropical affectation, and he knew it. The prints had come from a second-hand shop in San Francisco, in his student days. The curry,

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like sin, was something that followed the children of Mother India wherever they might wander, unto the seventh generation. The photographs were of his ancestral home, the colored ghetto in which his parents had once lived and worked. He had never seen it. He never would.

He sat in a padded recliner, his back to the apartment door, positioned so he could see both the prints on the wall and the photos on the shelf. The armchair was an emblem of the land in which he had been born and still lived, but hardly of the land he felt was most truly his.

He was not comfortable. He refused to recline in his sumptuous throne. He sat erect, clutching the chair arms, staring at the walls, the beads, the prints, the photos. The case full of disks was on the dining room table. He should, he knew, destroy them before the police got here. Those disks held evidence enough to damn him and all his bosses many times over. But . . . It was already far too late for his own salvation. His bosses had forced him to damnation. If he were caught, he would quite happily see them join him in prison. He would feel special glee because they were white, even, really . . .

Should he flee? The police were not here yet. He had time. He could pack a bag, call a taxi, run to the airport and catch a jet to . . . Where? Argentina? Brazil? Paris? Tokyo? God forbid, Johannesburg?

He shuddered. His hands did their best to shred the upholstery covering the arms of his chair. He could not move. The phone call from Gelarean had galvanized him into fleeing the lab for home. But the motive to run was now exhausted.

A lighted aquarium occupied the bookshelf below the photos of his parents' home. It was a saltwater aquarium, and it held a jellyfish, just one, a large one, the size of two fists, full-grown, the very first of his drug-secreting genimals. He stared at it. He was a success. He was. He could make genes, genes of all kinds, stand up and dance at his command. His bosses applauded his skills. His Armadons would, within a year or so, begin to displace the Buggies that now dominated the highways. His nettles were already spread wide across the land.

Then why was he cowering here?

He should not have sabotaged the Hawk. He had gone too far with that.

But that cop, that Fischer, Bernie Fischer, had been too close. Nick Gilman had told him so at Gelarean's party. They had a suspect for the Sparrow and the Assassin bird, and they were on the verge of an arrest. And then that Bernie had continued to hang around the building. He had pretended his interest was in Emily, but Chowdhury knew—yes! he knew!—that Fischer had been watching him, *him*. He had overheard the cop bragging to Emily about how close he was! And he had known that if the cops ever got him, he would have no more chances to kill Emily.

No more chances to free his Armadons of competition from her and her verdant Bioblimps. No, that wasn't true. Killing her hadn't even been his own idea in the first place. If he had accepted the idea, it had been mostly to get rid of her and her snide reminders of details he had forgotten. He knew the

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Bioblimps were here to stay. The company had the patent, and the orders, and it would see to that.

Something else was also true: If the cops got him, he would have no more chances to obey his masters, to free himself of debt and slavery, to grow rich and famous, to avenge his parents in the pages of history.

But they were white. They all were white. The cops, his masters, even Emily. They were the persecutors of his people and of his family. They were no better than the blacks, and they would be sure to see that he got all the blame.

Yes, he had made the cocaine nettle and the drug genimals. He looked again toward the aquarium on the bookshelf. He grunted and levered himself out of the armchair. He crossed the room, moving as cautiously as an old man. He unplugged the cord that powered the aquarium's light and water pump, removed the apparatus, and dropped it on the floor. He ignored the puddle that drained from the pump's tubing.

For a moment he simply stared into the water, at the jellyfish, *his* jellyfish. Its drug-laden tentacles were translucent white, almost invisible in the water. The bell, tinged with pink and blue, pulsed gently, slowly, moving water in and out of its internal chamber. In the sea, that pulsing would be used for propulsion; now it simply aided respiration.

He turned away and paced, his hands clutching jerkily at each other, around the dining table. He paused at the window, pushed aside the curtain of beads, and stared at the street below, so green, so empty. That, he thought, would not last long.

He turned, stared toward the aquarium, took a pace, and looked down at his box of disks. He took off his glasses, another affectation, pure window glass in the wire frames, and threw them to the table. They clattered as he took the final step to wrap his arms around the tank. He grunted again, lifted it free, and staggered back to his armchair. It was heavy. He sat, lurching, water sloshing over his lap and the upholstery. He positioned the tank as comfortably as he could and stared once more into its depths. He ignored the water spill. The cops would arrive soon, and after that it would not matter.

He had never had anything to do with the Sparrow, though he knew who had. But yes, he had sent the Assassin bird. Yes, he had put chips in the Mack, the Tortoise, and the Hawk. But someone else, his master, had given him the chips. He had given him his orders, too, for all but the Hawk. He had had to ask for *that* chip.

Could he have discharged his gambling debts some other way? Could he have refused to plant the chips? Could he have stopped with the nettle? Or the Assassin? Or the Mack? Had he succumbed, surrendered, obeyed, too easily? Even too eagerly?

He remembered his mother. His Mama. For as long as he could remember, she had been confined to her wheelchair, unable to walk, dependent on his Papa and himself for the simplest things. The Boers had broken her legs. They had raided a small, unlicensed clinic where his parents had been treating blacks.

The Kaffirs had broken her back. She hadn't been black enough. And she had been treating others who shared that

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handicap in the newly all-black, dead-black People's Republic of South Africa.

They had it coming. They all had it coming.

He was not sorry.

He was terrified.

But he was not sorry.

They had it coming.

And now the cops were after him. They had figured out who had put the chip in the Hawk. They knew who had done everything. And they were coming for him.

That was what the call from Gelarean had been all about. The cop, Bernie Fischer, had a warrant, and he was on his way to the lab.

Had Gelarean seemed to wish to keep him chatting on the phone? It did not matter. He had hung up. He had made excuses to his verdamt technicians. He had run.

And Fischer had been in the hall. With Emily. He had ducked and twisted and lost his lab coat and, gasping, ran. For some reason, they had not pursued him. But they would. The Hawk would land on his street and they would climb the stairs to his apartment and they would knock. And . . .

Fischer had been hanging around all that time, just waiting for him to slip. And he had. He had. He had. They had a warrant, and they were on the way, and . . .

He stared at the aquarium on his lap.

He wished the jellyfish had eyes. Then it might look back at him. Maybe it would recognize him as its creator. It might even be grateful. Would it raise a tentacle then? Offer him its cnidoblasts, full of bliss? Offer him escape?

But there were no eyes, only spots of pigment around the edges of the bell, light-sensitive but inadequate to the task of forming images.

It was his own design. It really was. And it was a success. He had doubted its appeal, but his friends were very interested in it.

No, not friends. They weren't. They couldn't be. Masters. They were masters. They had gotten him in their grip and encouraged him and stroked his ego until he would do whatever they wished. And he had.

He had.

His vision blurred as salt water brimmed his eyelids and spilled to run down his cheeks. Drops landed in the aquarium, splashed, and marked the front of his shirt with further droplets. His breathing grew deeper and more ragged.

Emily, he thought, had brought that cop, that Fischer, to the lab. They had conspired to spoil his dreams of fame and wealth long before he had done anything himself. He had not known it then, but when his masters told him what to do, they had been giving him the opportunity for justice. He wished he had succeeded. Then the cop would have vanished. He thought of Gelarean's house. And he would now be safe and looking forward to a mansion of his own.

He could, he knew, escape, even at this late moment. Even if his jellyfish had too few brains to offer him a tentacle. He could offer *it* a hand. He could reach into the aquarium, fondle it, let it discharge its cnidoblasts, its stingers full of heroin, into his skin. He was no addict. He wasn't used to the narcotic.

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There might even be enough, if he just left his hand in the water, to take him far away, forever.

Or he could get up again, and return the aquarium to its shelf, and reassemble its pump and light. He could go into the other room, where the terrarium was, and select a snake or two. Pale and potent ones, full of heroin and other drugs. Or there was a nettle on the kitchen window sill. He didn't use it, except by accident, when he was watering it and his skin brushed a leaf, but it was there.

But snakes and nettles were too much trouble. Oblivion was close enough within his reach as he sat there, the aquarium on his lap.

He stiffened and looked up. Was that the sound of a jet close overhead? The rush of air over wings arched to brake? A shadow moving swiftly past his window?

He sighed and returned his gaze to the genimal within the tank. Something had indeed landed outside his building. Not hard by his door, not quite, but a little down the block. He heard the ripping sound made by a bird's—a Hawk's—claws as it walked on turf, the clap of the vehicle's closing door, voices with familiar rings, footsteps on the walk outside.

He raised a hand and stared at it as if he had never seen it before. He turned it back and forth, noting the soft brownness of the skin, the wrinkled folds that let the skin slide and stretch over the knuckles, the nails, the hairs, the lines. In a moment . . .

The voices had stopped. The lobby buzzer sounded. There was silence, and then there were footsteps on the stairs, drawing nearer.

The footsteps stopped. He stared at the aquarium and his jellyfish. He felt for the first time the coolness of the water that had soaked his lap.

His doorbell rang, and his hand, that marvelous structure of sliding tendons and folding bones and stretching skin, his hand began to tremble.

"Ralph?" It was Emily. And with her . . .

He sighed. He lowered his hand into the water.

Chapter Twenty-One

Emily had never been in a Hawk before, but the layout of the pilot's pod did not surprise her except in one thing. The clear bubble of the pod itself she had been able to see from the outside, and the single pilot's seat within it. The control panel was clearly a control panel, though it had a few knobs and buttons that the Tortoise lacked. But when Bernie had said a Hawk could carry two people, or even more if they were not large, she had expected to find a small seat or bench beside his own.

But the passenger seat was just a tiny shelf in the narrow space behind the pilot, and the Hawk was clearly designed to function best with only one aboard. With her aboard, its takeoff was not the elegant, assertive leap into the sky she had watched before. It was slower, struggling, lifting off the pavement and climbing at a shallow angle like some ancient mechanical airplane straining to escape the bonds of gravity.

Like that ancient airplane, once aloft the Hawk had no trouble. She peered through the sides of the pod, past the arch of wing, or she knelt to look over Bernie's shoulder and see ahead. When

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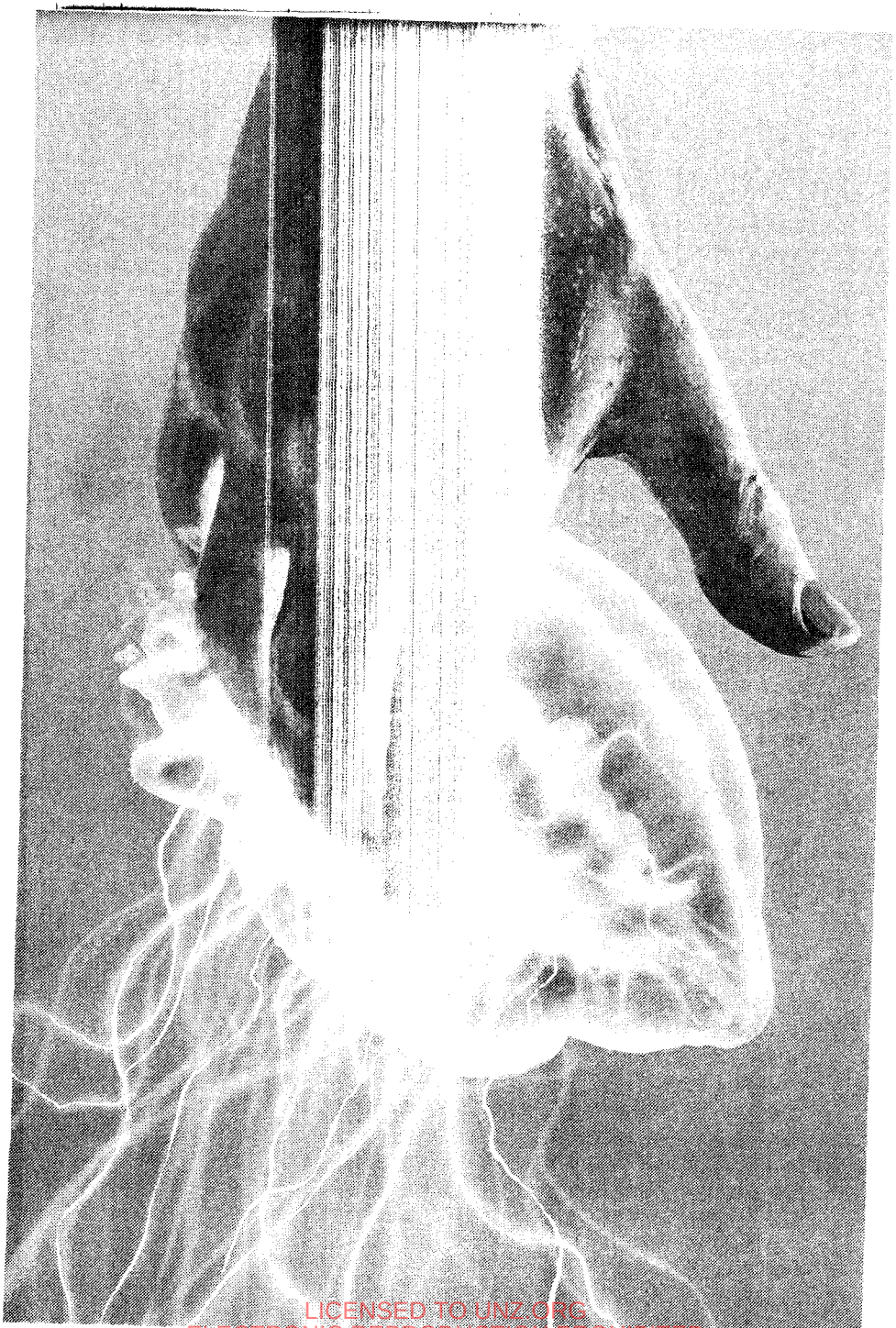

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her breath ruffled his hair, and his scent rose to her nostrils and the tears to her eyes, he took a hand from the control yoke and pointed. "There's the airport." The Hawk banked and swept toward an expanse of foliage and bioform houses subdivided by green roadways. "Greenacres." She settled back on her jumpseat and quietly, hoping that he would not look in his rearview mirror and notice, wiped her eyes. She had made her decision, and it was the right decision, but scent was famous for its power to evoke memories.

Her eyes dry, she peered again out the window. Greenacres was still visible to the left. They were descending toward a nearby neighborhood, older, filled with brick walkups, though its roadways were turfed, not paved. Gaps between the trees that flanked the roadways revealed concrete sidewalks.

"I think this is the block we want." The engine fell quiet. The wings cupped to seize the air and brake. The Hawk plummeted toward the ground, touched the turf, and ran a few steps. "There." Bernie made it walk forward half a block before he pulled it to the curb that still marked the edge of the roadway and pushed at a recessed toggle switch. The bird bent its neck until it could tuck its head beneath the feathers of one wing. The movement hesitated when one great eye was even with them, blinking, staring as if reproachfully. "That will keep it out of trouble."

Bernie held the pod's hatch while Emily squeezed out of her niche and jumped to the ground. Then he slammed it shut, and they looked at the three-story building before them. It was an old building, with the grime of many decades visible in its pores. Its windows and doorways were framed with limestone, its woodwork had fairly recently been painted a rich, dark brown. The windows themselves were closed to keep out the growing heat of the day and keep in the cool of air conditioning. Thick draperies concealed the rooms wherever they could see. The mixed aromas of genimal manures wafting from the alleys that flanked the building to either side betrayed the presence of nearby stables.

"This is not," said Bernie, "a poor neighborhood."

"It's not a rich one either," said Emily. She did not know why she felt impelled to defend Chowdhury against that hint of ill-gotten gains. She did not like him, and he had tried to kill her, after all. Was she really defending Neoform, her company? Or was it simply truth? The neighborhood was indeed a middle-class neighborhood, if a little toward the upper crust of the loaf.

"Let's see if he's home." Bernie led the way into the building's entry. The inner door, just past a tier of mailboxes, was glass. Beside it was a speaker and a row of buttons, each one marked with a resident's name. He pressed the one for Chowdhury.

There was no answer.

He tried another, and then another and another, until finally the speaker burst scratchily into a "Yes?"

"Police. Buzz us in, please."

"Just a minute." They heard a door close upstairs, and in a moment a woman, her hair short, grey, and unbrushed, her face round and wrinkled, her body wrapped in a faded bathrobe, appeared on the stairs inside. Bernie

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held up his wallet, with its badge exposed, in one hand. In the other, he displayed the warrant he had brought. The woman nodded and came the rest of the way to the door. "You can't be too careful," she said as she unlatched the door. "Who are you after?"

"Thank you," Bernie said as he pocketed his wallet again. He ignored the question.

Emily glanced at the name list by the door. The helpful woman was apparently Mrs. Jasper; she looked retired, and she was obviously curious. Emily shrugged at her and followed Bernie up two flights of stairs and down a short hall. The doors she passed were painted in bright primary colors.

Emily stopped when she came to a door painted bright yellow. It bore both a knocker and a peephole, and Bernie was pressing a button that jutted from the wood of the door's frame. She could hear the doorbell's buzz.

When there was no response, and no sound of movement from behind the door, Emily called, loudly enough to be heard within, "Ralph?" They waited a moment, and then Emily was startled by the clearing of a throat close behind her. She turned, and Mrs. Jasper said, "He's home. I saw him come in just a little while ago."

She backed up abruptly when Bernie motioned for the two women to get out of his way. Then he drew his gun, stepped back, raised one leg, and delivered a heavy kick to the door beside the latch.

The only result was a dark imprint of his shoe sole on the yellow paint. He might as well have kicked a cement wall. "Goddamn steel doors." He tried again, harder, and again. On the fifth try, the wood of the frame gave way and the door popped open, only to reveal the chain of a security lock. A sixth kick tore that loose, left Bernie panting, and let them in.

Bernie went first, the gun still in his hand. From behind him, Emily sniffed curry and sea water, saw bead curtains over the windows and grinning demons on the walls, and heard . . . nothing. Silence. Broken only by . . .

A heavy armchair faced one corner of the room so that whoever sat in it could see both the wall on which the demon prints hung and a bookcase to the left. The bookcase carried photos, books, a small radio, and knick-knacks. Irrelevantly, Emily thought the veedo must be in the bedroom.

"There they are." Bernie's voice held a distinct note of satisfaction. His gun was pointing at a table to the right. On that table lay Chowdhury's glasses. Beside them was the disk-case Chowdhury had been carrying when he fled the lab. Presumably, she thought as Bernie took one long step to seize it, it held evidence.

On the floor at the foot of the bookcase was a tangle of tubing and apparatus that looked to Emily as if it had come from an aquarium. From the chair came the only sounds that broke the silence: The intermittent sough of breath, quietly hoarse, growing quieter.

"What has Mr. Chowdhury done?" Mrs. Jasper tapped Emily on the shoulder. Emily looked at her, wrinkled her nose at the stale, sour scent of a bathrobe—or a body—that needed washing, and stepped into the apartment. She said, "Excuse me," and closed the

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door. Then, remembering the now-broken latch, she leaned back against it. Bernie glanced at her, grinned mirthlessly, and stepped around the chair.

"Shit!"

Emily promptly left her post to see what he had found: Chowdhury, head back against the cushions of the chair, mouth open, breath now losing its struggle for life, an aquarium on his lap, one hand in the aquarium. Bernie lifted the hand from the water. It was clenched on and covered by a gelatinous mass of pastel blue and pink.

There was a shriek behind them. He turned and pointed his gun at Mrs. Jasper, who had seized her opportunity to see what was going on. "Out!"

She fled. Bernie turned back to Chowdhury and used the muzzle of his gun to pry the fingers open and scrape the jellyfish away from the human flesh. "Call the department," he told Emily. He recited the number. "Tell 'em we need medics. A heroin overdose."

"I made them," he was saying. His eyes were shut, and his face was beaded with droplets of sweat. He had to strain to speak, and his voice was hoarse. "Yes, I made them. They're mine. Mine. I made them. I'm a genius. They said so. They're mine!"

Siren wailing, the pair of medics, one male, one female, had arrived before Chowdhury's breath could gutter out. The younger medic had dashed up the stairs, a hypodermic in her hand, checked the signs, heard Bernie's report of what the jellyfish had been designed to produce, and administered the antidote. Then, when Chowdhury had begun to gasp and spasm, she had said, nodding, "He'll make it," and gone to help her partner. Now they stood aside, their equipment—stretcher, defibrillator, blood dialyser, IV stands and bottles, drugs, all that they might need—stacked in cases beside their feet.

Bernie had read Chowdhury his rights as soon as the dark-skinned man could respond to his name. Emily wondered whether he was in any state of mind to know what was going on, but there were witnesses to say that the formalities had been observed. She forced back tears of automatic, involuntary sympathy and told herself that, yes, he was a genius, she had said so herself, but . . .

"Why did you make them?" Bernie had produced a small recorder from a pocket as soon as Chowdhury could talk. Now he held the machine close to the man's lips, its microphone grill ready to capture whatever might emerge.

"I had to."

"Why?"

"Shoulda know' better." The voice tailed off, and the older, senior medic leaned forward, ready to intervene. But it strengthened again. "Owed 'em money. Lost 'tall."

"How?" Bernie's voice turned sympathetic.

"Gam'ling." His voice slurred, and his chin fell forward onto his chest. Bernie gestured urgently, and the medic promptly slipped a needle into Chowdhury's arm. He gasped as the drug took hold, and Bernie said, "Gambling?"

Chowdhury gasped again. "They said, nettles . . . would pay it all. But then . . . wanted gen'als."

Genimals. Once, Bernie thought, that slurred word would have referred to the threat of agonizing torture. He nodded.

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"Why were you trying to kill Dr. Gilman?"

There was a long pause. Chowdhury twisted in his seat. His face contorted. Then, " 'S white. Made funna, Armadons. But . . . wasn't my idea."

"Whose idea was it?"

He opened his eyes. When they had first seen him that morning, they had been wide with panic. Now the pupils were contracted to pinpoints. The whites showed in a ring all around the brown irises. He stared at Bernie, looked past him to Emily, and then to the medics. He groaned, shivering, "Assassin," he whispered. "Mack. Tortoise." He looked back at Bernie. "Hawk. Wanted get rid of you. 'Fraid you'd get me." He paused. "Not Sparrow. He did that."

"Who?"

"Baas. My boss. Gave me . . . chips." The voice weakened again, and Emily laid a hand on Bernie's arm. "Can't this wait until he's fully conscious? There's no rush, is there?"

He shrugged his shoulder, as if to shake her off. He turned his head to meet her gaze. "Whoever it is could get away. Or destroy evidence. Or try again, and this time he might be more successful. I wouldn't want that."

He aimed his attention at Chowdhury once more, and Emily felt her skin turn pink with embarrassment, or shame. She had rejected him as too cruel, too hawkish, in favor of her meeker husband. She had not, perhaps, truly realized that there was a place for such personalities. And this was it. Only ruthless determination could possibly pry the truth from her erstwhile colleague, so nearly dead. If Bernie failed, then whoever was behind Chowdhury would indeed be free to try again. She shuddered at the thought.

"Who is he?"

"Had to ask for Hawk. Rest were . . . his idea."

"Who is your boss?" Bernie's voice was louder, more insistent, as if he hoped to break through whatever resistance might be keeping the name concealed.

Chowdhury's grin was a death's head rictus. "Knew 'bout debts. Drugs. Gave me orders."

"Who is he?"

The grin faded as Chowdhury's eyes dropped closed. He was still breathing, but when Bernie gestured for another injection, the medic refused. "He's had it, Fischer. Save it for later."

"Shit."

Chapter Twenty-Two

Bernie and Emily stood on the walk, watching the two medics maneuver Chowdhury, on the stretcher, through the building's doorway and into the Pigeon ambulance. The window of one second-story apartment was open now, its drapes pushed back to let Mrs. Jasper lean out, elbows on the sill, mouth half open in fascination. No one peered from the building's other apartments, presumably because their tenants were at work, but small knots of gawking passersby had clustered near the mouths of the alleys to the stables.

"So who's his boss?" Bernie's expression was a dissatisfied frown. Chowdhury had admitted that he was behind every case of sabotage except that of the Sparrow, though only under the duress of blackmail. Chowdhury, if

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he could be believed, thus had some extenuation for what he had done, and Bernie did believe him. The man had been convincingly sincere.

But he would still stand trial. He remained responsible for what he had done, for whatever reason. Though the mystery boss' crimes had been far greater. He—or she—had impelled Chowdhury, and had personally, directly caused all the many deaths of the Sparrow incident. Chowdhury had destroyed two aircraft, one of them police department property, and killed, with the sabotaged Mack, a handful of bystanders. Bernie snorted. Chowdhury was hardly an innocent. "Florin?"

When Emily asked, "Who's Florin?" he took a moment to explain. "He was at the party. Pink tux. And was talking to our man there." He gestured toward Chowdhury, whose feet were now disappearing into the ambulance pod. She nodded, and he added, "Runs a casino. God knows what else. Probably drugs, now."

The medics finished securing the gurney, climbed into the front of the ambulance pod, fired their twin jet engines, and boosted quickly into the air. Their siren was silent, for the emergency was over. Chowdhury was no longer in medical danger, and there was no need to rush to get him to his cell.

When the Pigeon was out of sight, Emily said, "There's another possibility."

"What?"

"He has a real boss, you know. Who was also at the party."

Bernie was still for a moment, thinking of locked doors, another Greenacres address, greenery once glimpsed behind a window, something Emily had told him before, that very morning, and the smell of money. "I'll need another warrant."

"So get one."

Within an hour, the Hawk had landed again at the Neoform lot and Bernie was telling Miss Carol that he needed to see Gelarean. The receptionist looked at Emily, who nodded and said, "Yes, we caught Ralph."

Miss Carol's eyes widened. "And he told you someone else was involved? Was it . . . ?"

"Miss Carol!" Bernie's voice was firm.

"Well!" She pursed her lips. "I *am* sorry. He's not here."

"Where is he?" asked Emily.

"He went home right after you left before. When you were chasing Ralph. He said he didn't feel very good. I offered him an aspirin, but . . ."

She had lost her audience. Bernie had turned and begun to run for the door and the Hawk as soon as she said Gelarean had gone home. Emily was right behind him, and minutes later they were in the air over Greenacres.

"There's his place." Bernie didn't bother to point. The upturned shape of the gengineered squash was unmistakable.

The Hawk swept closer, and the dome of Gelarean's tower study became distinguishable, the broad expanse of glass, the green of the plants he grew there, the brown smudge that must be his desk. Closer yet, and that smudge was indeed a desk, its edges overhung by plants, someone seated at it.

"That must be him." This time he

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pointed, and Emily, leaning over his shoulder, grunted in agreement. They drew closer, and they could make out small, white-bordered squares upon the desktop. Their centers were dark. They seemed about the size of the hands that lay beside them. "Photos," Bernie guessed. "But of what?"

As the Hawk landed on the lawn, Victoria Gelarean opened the front door to stand on the porch, her hands clasped before her and her birthmark far brighter than it had been at the party. When they approached her, she said, "He told me to keep you out, but . . . " Bernie wondered whether she knew just what Gelarean had been up to, or cared. He was sure she knew how futile it would be to bar the door.

She shrugged and gestured toward the interior of her home. "He's upstairs. In the tower."

Bernie put the badge he had had ready to display back in his pocket. The search warrant he had taken the time to obtain, and now held rolled in his right hand, was less easy to dispose of. He passed it to Emily, said, "Thank you," to Gelarean's wife, and led the way into the house.

He headed directly toward where he thought the entrance to the tower and Gelarean's den must be. The entrance, when they came to it, was an ordinary-looking door at the end of a short hallway. It was, however, locked, and Victoria Gelarean did not have a key. "He keeps it to himself," she said. "He calls it his castle. This is his drawbridge." After a moment of awkward silence, she added, "It's up now."

When Bernie swore and tried to kick this door down, too, as he had the one to Chowdhury's apartment, it shrugged off his attempts. "Steel frame," he panted, drew his gun, and aimed its muzzle at the lock. The roar of the magnum was deafening in the confined space of the hall, but it was effective. As the echoes died, they saw that the door was now ajar, revealing a narrow stairway.

"He always said that was the only way anyone would break that door down."

Gun still in his hand, he peered up the stairs. Green light, the hue of forest shade on a sunny day, spilled down to meet him and announced that there were no further obstacles between him and Gelarean. He turned to look at Victoria, said quietly, "*You* stay here," and went through the door. Emily followed him.

The room at the head of the stairs, Gelarean's den, was a ring of green in which they stood like lurking predators. Gelarean's desk sat in full sunlight, the only part of the room so illuminated, like a spotlit stage. A small Oriental rug lay on the polished wooden floor to one side. Gelarean himself was a grey-haired, round-faced, beak-nosed figure, arms spread, hands flat on the empty desktop. He might have been a medieval judge at his bench, a priest at the altar, a lord about to receive tribute.

He said, "It's all up then, is it?" and Bernie thought that resignation never sounded quite so final as when it was expressed in a British accent.

He pointed his gun at the man, stepped out of the green shadows, nodded, and said, "You are under arrest." Taking the warrant from Emily, he tossed it onto the desk. Then, drawing a small and tattered card from his shirt

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pocket, he added, "Anything you say may be used . . . "

Gelarean heard him out expressionlessly, his eyes fixed on the cop. When Bernie was done, he shrugged and said, "So much for tradition."

Emily pointed at the desk. "What happened to the photos?"

Gelarean's eyes shifted to her, and his expression grew dark and threatening. Bernie heard the woman step backward beside him, just far enough to tell him that she felt Gelarean's glare like a blow. "You!" he said. "You must have been born under a bloody lucky star."

He shifted his attention back to Bernie. "Nothing worked, did it? And I only wanted her out of the way."

"You wanted your name on my Bioblimps. You've done that before," said Emily.

"I never had to kill for it."

"The photos?" asked Bernie.

"What photos?" He tried to pull himself closer to the desk, but Bernie was already leaning over him, pushing him back with the muzzle of his magnum, pulling open the desk's central drawer.

The photos were there, face down, scattered as if they had been swept suddenly into hiding. Bernie picked them up and threw them on the desk, face up.

They were dim, shadowed, their colors off as colors can only be in instant photos of the sort taken to commemorate important occasions. But the subject was clear: Each one showed a woman, young and black and nude; the poses varied, as did what had been done to her.

"Jasmine." Bernie's voice was barely above a whisper, hoarse and tortured. In a moment, he looked down at his hand. His knuckles had whitened where he gripped the gun. He looked past his hand, past his gun, to the shadows beneath Gelarean's chair. Gelarean had folded his feet beneath him there, as if to hide them. But Bernie could see them clearly, see how small they were, just the size of a certain bloody footprint that he still bore imprinted on his mind.

"Ee kai vai." He felt like vomiting. Deliberately, he relaxed his grip. He forced himself to put the gun back in its shoulder holster. He took a deep breath. He turned to look at the plants that filled the room and glowed in the sunlight. "Nettles," he said. "Cocaine nettles. You are a son of a bitch. I'll bet you even put that chip in the Sparrow yourself." He paused. "Care to tell us how you did it?"

The first time Bernie had met Gelarean had been when the man had so cheerfully announced that Emily had won her patent. He had struck him then as a man whose joviality was a false front, a man who concealed his true self. Now that true self shone through in a smirk of triumph, and Bernie was not happy to be proven right.

"I am," said Gelarean, "a Palestinian. And my fellows are everywhere." Bernie vaguely remembered the Palestinian diaspora from his childhood. The refugee camps had finally emptied, and their occupants had settled throughout the world. They had not, however, surrendered their hatred of Israel, or of its allies. "It was not hard to gain access to the Sparrow," he added, and his smirk became once more a glare. "I thought I left no traces. But then you appeared, pretending to be sniffing after

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Dr. Gilman." He shrugged. "I delegated the next attempts."

"To Chowdhury. Why him?"

"He was in debt to my wife's cousin. And he was already making . . . " A gesture indicated the nettles and drew Bernie's attention to a single fish tank on the far side of the room. It held three snakes, larger than those in Chowdhury's lab.

"He was . . . " He hesitated as if he were searching for the right word. "Vulnerable. Biddable. He would do what I told him to do."

Emily made a disgusted noise. "And you had already told him to make those drugs. . . . "

He shook his head. "I was not involved with the nettles. The genimals, yes."

He glanced toward the fish tank and the snakes and began to sidle out from behind the desk. Bernie stopped him with one upraised hand. "But why? And how did the girl come in?"

Gelarean's open hands moved up and out. "It was good business for the family. But . . . " Gelarean's tone remained as reasonable as ever, but now his forehead wrinkled and his eyes widened in the intent stare of the fanatic. "The country deserved it. It's always been the Great Satan, the stronghold of Zionism. If it had virtue, if it knew and followed Allah, there would be no problem. It would not be the enemy of all Palestinians, and there would be no market for the drugs."

"But we're not Moslems," said Emily. "We don't know Allah. We have no virtue. And that makes us fair game."

He nodded earnestly, as if pleased that she understood him so well.

"You're raving."

"Let's go," said Bernie.

Chapter Twenty-Three

The case was not quite closed. Bernie had the villains, one in a hospital bed, the other in a cell, and he had many of the answers. But he did not have them all, and he knew that Gelarean's lawyers would be trying to pry him loose as quickly as possible. The weekend, therefore, gave him little rest. He had to interrogate his catches more thoroughly, turn his ferrets loose in Gelarean's computers, survey Chowdhury's disks, question Victoria Gelarean, and try to find Greg Florin. Unfortunately, though the disks held clear evidence of his involvement, Florin had dropped out of sight. He was not at his casino, nor at his new project, the "farm," and his employees and associates all claimed that they knew nothing.

Bernie had no time for anything but the investigation until well into the next week. It was then that Lieutenant Napoleon Alexander, the Count, called him into his office and said, "Well?" Bernie's preliminary report, its cover sheet only slightly curled, was on the desk in front of him. He looked at it and added, "I've skimmed it, but let's have the gist of it."

Bernie gave his boss his usual sloppy salute. "I remember thinking," he said. "When the call went out about the Sparrow. That it was terrorists." He shrugged. "Gelarean's a Palestinian, and his records show that he's been giving them money since before he came to this country."

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"You can't hang him for that," the Count said. "Randecker gives to the Irish Republican Army, but he's no terrorist."

"No, sir. But Gelarean may have done a little more. When I confronted him Friday, he bragged about his contacts. And the records say he's had guests from abroad. They may have been more active terrorists."

"So he's aided and abetted."

Bernie nodded. "That changed when Chowdhury piled up his gambling debt with Florin. As it happens, Gelarean's wife is a Campana. So he had a line into the Mob."

"If we had known that—"

"We might have suspected his involvement earlier, but that's all. If we could be damned for our relatives, none of us would have any hope of heaven."

He paused while Lieutenant Alexander rummaged in a drawer, found an old pipe, tucked its bit between his teeth, and muttered, "There's a little flavor left."

"Anyway, Florin pushed," Bernie continued. "He wanted something to revive the drug trade, and Chowdhury suggested the cocaine nettle. When he produced it, and it worked, that was when the word reached Gelarean. He thought of asking Chowdhury to come up with drug-producing genimals, and when he realized what a grip he had on the man, he had him install the chips, program the Assassin, and so on."

The Count shook his head. "A good job, Bernie. But what's his motive? Greed for the drug money, I can understand." He patted the report on the desk before him with one hand. "Even that business about attacking the 'Great Satan.' But why did he want to kill Dr. Gilman?"

"He has a nasty habit of stealing credit whenever he can. Once her patent went through, there wasn't much point in continuing to try to kill her, but by then I was on the scene. They both thought I was after them."

"And Chowdhury panicked."

"It only has to happen once."

"And the girl? Jasmine Willison?"

Bernie made a face. He had been telling Connie everything, repeating his report to the Count, and she had asked that same question. He wished there were a better answer than the one he had: "For a while, I thought that would turn out to be Chowdhury. But it was Gelarean, though he won't talk about that. He's guilty, he admits it, and the photos in his desk are quite enough proof of his guilt. But why? He's nuts. All fanatics are nuts, and too many of them are nuts about blood."

They were in Connie's small living room, side by side on a couch that was little more than a pad of foam rubber covered with soft, loosely woven fabric. Its back was a line of colorful pillows that leaned against the wall. A bolster covered in purple shag served them as a hassock. To one side, a low table of zebra wood and slate held their empty coffee cups.

The rest of the room was no more elaborate. A ceiling fixture threw spots of light onto one end of the couch, three metallic photos upon the wall, a veedo unit with slots for tapes and disks. A goldfish bush sat by the window, where light could hit the leaves; two colorful fruit, nearly ripe, wriggled on their

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stems above a bowl of water. A third had already fallen into the bowl, where it swam about as if it had always been a fish. On the floor near the plant's pot lay the feather Connie had retrieved from the dead Hawk.

"Or damage, anyway," she said. She flipped a pillow flat on the end of the couch and stretched out. Her bare foot poked at his knee. He captured it in a large hand and kneaded the toes. "Wasn't that why he wanted the drug genimals? And why he didn't simply take an axe to Emily?"

"Yeah." Bernie sighed. "He liked gore, didn't he? Emily didn't."

Her toes curled around his thumb. "You do, too."

"Even if it makes me throw up?"

"In a way. And so do I. That's why we're cops."

"Two of a kind," he said.

"Predators. Hawks."

"But not wild. Not wolves." He meant, he thought, that they did not prey upon society. They were domesticated, and they served society, as dogs did the sheep and shepherd. Perhaps, for all that he liked to compare himself to a Hawk, he was not a hawk. Yes, hawks were as domesticated as dogs, but they were hunters, fighters, not protectors, guardians. If he were truly a hawk, he would have to join the army. But that did not appeal to him at all. He was a cop.

He sighed. he wished it really mattered to anyone but the girl's family and friends why Gelarean had done to her what he had done. But whatever the reason, the man would spend many yeras in prison. The Sparrow alone was enough to guarantee that. And when he got out, he would surely be deported. He would be no problem ever again for this society. Sadly, there was no shortage of people like him. There never had been. There never would be.

Some things never changed.

With a wiggle of her toes and a shift in position of her foot, Connie changed the subject. "And now she's done with you?"

He nodded. "You were right. At least we had our fling. And now she's gone back to her husband."

"I thought that might . . . "

He let his hand slide up her calf. "You going to leave me, too?"

"No husband to go back to."

He hesitated, letting his eyes search her face. "We could change that."

Now it was her turn to hesitate, and he thought that she must be as used as he to the single life, perhaps as reluctant to let it change. But . . . "Was that a proposal?" she asked. Her voice had a small crack in it.

He looked away. "I suppose it was."

Later, they mounted the dead Hawk's feather on the wall above the couch.

Chapter Twenty-Four

Where Bernie had spent the weekend in a frenzy of investigation, Emily had spent it feeling frustrated and bored. The threat that had been hanging over her was gone, but so were the suspense and excitement that had accompanied that threat. She felt let down, disappointed. There would be no more Sparrows landing in the freeway to gobble her up, no more Assassins in the trees, no more Mack trucks lunging out of traffic to run her down, no more runaway Tortoises. Nor would there be handsome police-

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men to sweep her off her feet. The romance was gone from her life.

Truly, she knew it, Nick was the man she wanted. Gentle, supportive, reliable, the father of her child, the cradle of her heart. But, for all that she had told Bernie to keep his distance . . .

He had been efficient, smooth, and capable. She had told him he was cruel, and he had agreed. If she had thought to wonder, she would have expected him to show a grand ferocity when he confronted Chowdhury, and then Gelarean. But there had been none of that. He had only been strong and direct and to the point. He was a defender, not an attacker, not a despoiler. He was less gentle than Nick, but he, too, was supportive in his way, and reliable.

Halfway through Saturday afternoon, she found herself wondering how much damage her marriage had sustained. Nick was forgiving, yes, but she *had* briefly foresworn her loyalty to him, if not her love, and he knew it. It had to make a difference, and a difference that she would have to struggle to overcome. Not that Nick would keep reminding her, or that his feelings would be lessened by the memory. He was too forgiving for that. But she, she carried the guilt, and she would have to exorcise that burden.

She was pacing back and forth in the living room, her voice echoing within her skull, when Andy tugged at her jeans and cried, "Mommy!"

She bent to him, suddenly aware that she had been ignoring persistent demands for attention, and said, "Yes, dear?"

"My Warbird went under the couch. Get it for me?"

She obeyed, but when Andy followed up that demand with a request for a story, she said, "I think it's about time I baked us some bread. Want to watch?"

"I wanta help!"

"Just watch, until you're bigger." Nick was assembling the ingredients for a cake, but she chased her husband from the counter of "his" kitchen to the table and dove into her occasional specialty. It was also her therapy, for she had long since learned that pounding bread dough into submission could quiet her mind even when her thoughts churned so vigorously that she could concentrate on nothing else.

But this time her thoughts refused to quiet. Instead, they jumped their track. How much had she contributed to the final roundup? She had identified Chowdhury's "boss," but surely only seconds before Bernie would have seen it himself. She had made a phone call. She had . . . What else? She had given Bernie someone to talk to, and that was all. She hoped she gave Nick something more.

At work, one question on everyone's mind was what would come of the Armadon project now that Chowdhury was out of circulation. Neoform had lost not only one of its chief researchers and product developers, but also its research director, and on Monday, no one knew what would happen next. She and Alan Bryant were in their domed fabric "barn" that afternoon, checking on the growth of the Bioblimps, when Alan said, "Do you think they'll make you the new chief?"

She shook her head. "I'm not political enough. And I wouldn't want the

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job if I were." She gestured past the net that closed off most of the dome's interior space, forming a huge cage in which young moving vans rose and fell above a long food trough. Their bells swelled and contracted, propelling them about their space, in and out of the zones of blue and gold illumination defined by the dome's panels, which would not be allowed once they reached full size, when strapped-on control pods would cover their mouths, all except a narrow opening for their breathing. Their tentacles writhed as they plucked chunks of unidentifiable meat from the trough and inserted them into the stomachs within the bells. The sphincters that controlled the openings to their cargo holds alternately gaped and puckered. Each van bore a stylized sailing ship on the side of its gasbag. "They'll be too big for this place soon. We'll have to take them outside and tether them."

"You would if you were political," said her aide. Then he shook his head. "We won't need to tether them. Their nervous systems are so rudimentary that we've had some problems designing the control circuitry, but it's almost ready now."

"Tether them anyway. If the controls have been that tricky, something's bound to go wrong. And we don't want them wandering off and eating pedestrians."

Alan began to laugh, looked sidelong at her, and let it die. The image had been a funny one, straight out of ancient monster movies, but it did, he quickly realized, come a little close to home for his boss. "Have you heard anything about Chowdhury's lab?"

"Not a thing. I think they're pretending he's taking a little vacation. Business as usual, for now."

The pretence lasted until Wednesday. That morning, when Emily reached her lab, Alan was holding a piece of paper. As she entered the room, he handed it to her. She stopped, leaned against a bench, and read:

TO: All Employees
FROM: T. Gruene, Personnel
RE: Supervisory changes

We have recently lost one of this company's three founders, Director of Research Dr. Sean Gelarean, and a valued employee, Dr. Ralph Chowdhury, Senior Researcher in Product Development.

We will shortly advertise for a new Director of Research. Until the results of our search for a replacement are in, Dr. Gelarean's post will remain vacant. All reports and requests for travel funds, supplies, and project approvals should be routed to Dr. Atkinson.

Dr. Chowdhury's position will be filled by Dr. Adam Chand. Until now, Dr. Chand has been a research assistant in Dr. Chowdhury's lab.

"It doesn't say a word about why we lost those 'two valued employees,' " said Emily. "But that's good. In fact, Wilma might make a good replacement for Sean. And Adam . . . "

"He'll do fine," said Alan.

Something in his tone made Emily think that he, too, would like to be a lab chief, but she did not respond. Instead, she handed the memo back to him and

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said, "Better change that routing in the computer."

A little later, crashing sounds, as of furniture breaking, drew her down the hall toward Chowdhury's—now Chand's—lab. There she joined a number of her colleagues as they watched, bemused, while Sam Dong and Micaela Potonegra expelled Chowdhury's chosen furniture, so obviously high, ungainly, and uncomfortable, from the lab, and Chand told a pair of maintenance men, "Out! Get us some decent furniture. But get this stuff out of here!" He sounded exasperated, but there was a strange smile on his face. Emily thought it must signify a sense of triumph and relief, uncertainty and determination.

"But Dr. Chand," one of the maintenance crew protested. "It takes weeks for an order to come through."

"Then bring in the furniture from the other lab, in the barn. We'll do all our work in here, until the new things come and you install *them* in the barn."

"Uh, we could shorten the legs on some of these. . . . "

"Then do it. In the barn. Get it out of here!"

"Yessir!"

Chand's face did not lose its strained mixture of expressions as he turned his attention on the spectators. "The show's over," he said. "We've got work to do." Then, as he seemed to notice Emily for the first time, he added, "Emily! Come on in!" and jerked his head toward the lab behind him.

She followed him in, to find Sam and Micaela pausing in their labors to stare at her, smiling almost as if she belonged with them. Perhaps, she thought, she did, for though they had borne the daily brunt of Chowdhury's temper, she had been the one he had been trying to kill. "Adam," she said. "Congratulations."

"And now what?" he said. Suddenly, the uncertainty was uppermost in his expression.

Emily looked around the room. The equipment—workstations, DNA splicers, and more—was now concentrated on a single workbench and the tops of the lab's freezers and incubators. "You'll do your own thing," she said. She pointed at the puffer fish hanging from the ceiling. "What's that?"

Chand's face lit up. "Well, sure," he said. "I was planning to . . . " Then her question penetrated, and he followed her finger with his gaze. "I've been trying to design a submarine," he added more slowly. He explained the fish and the direction of his thought, while Emily nodded encouragingly.

Micaela Potonegra interrupted: "We will be carrying on, though. The Armadon . . . " She hesitated, as if aware that the Armadons might be a sore point. They were, after all, potential competition for the company funds and energy Emily's Bioblimps would also need. They also stood, in the mind of any Neoform employee, for Chowdhury. They *were* Chowdhury, in a much more solid and positive sense than the cocaine nettle and hedonic genimals. "The Armadon prototypes will be ready for testing soon, and we do want to see them into production. We've already put a lot of work into them, you know."

Emily did know. They had done most of Chowdhury's design work, and all of the donkey work of feeding and cleaning and testing, just as Alan Bryant did for her. In a very real sense, the

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Armadons were as much their babies as they were Chowdhury's. But they had been Chowdhury's idea, and he would get the credit, even if he must enjoy it in a prison cell.

Micaela pointed toward the back of the room. "We still have those four in here." Emily looked and saw the cage on the floor, crowded with the baby Armadons she had first seen just the week before. "And they can't stay in that cage any longer. They can hardly move."

Nodding that Micaela was speaking for them all, Adam Chand said, "Would you like one? It'll grow, you know, and when it's big enough, we can have the prototype shop fit it out. That won't cost you anything."

Emily looked back at three expectant faces. Did they feel that they owed this to her, as recompense for what Chowdhury had done, or tried to do? Then how could she say no? And besides—the thought came to her mind for the first time in weeks—her family did need a second vehicle. Let this one grow up, and it would be perfect for Nick, though they would have to enlarge the garage. And he would be delighted by its rarity on the road, though surely that would not last. Andy would be delighted by it now, as a novel pet and as a replacement for the Chickadee in his affections.

How could she say no?

She didn't.

She said, "Thank you." ■

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The Alternate View

COLD FUSION, PRO-FUSION, AND CON-FUSION

John G. Cramer

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As I write this column in early May, the cold fusion "discovery" of Prof. G. Stanley Pons of the University of Utah, and Prof. Martin Fleischmann of Great Britain's Southhampton University had just been featured on the covers of both *Time* and *Newsweek*. Pons and Fleischmann (P&F) claimed in a March 23 press conferences and in papers submitted to *Nature* and to the *Journal of Electrochemistry*, that by electrolyzing heavy water using a 4 millimeter diameter rod of palladium, a noble metal that readily absorbs large quantities of hydrogen, they have achieved nuclear fusion at room temperature. Soon after the announcement, the price of palladium on the commodities market soared from about $120 per troy ounce to about $180. The announcement also produced a veritable scientific gold-rush, with scientists at laboratories around the world (including my own) scrambling to obtain palladium and heavy water to test this amazing effect.

That happened almost six weeks ago, but an unresolved question remains: is P&F cold fusion a real effect, an out-of-the-blue solution to the world's pressing need for energy, or is it perhaps another demonstration of humanity's boundless capacity for self-delusion, particularly when the prospect of limitless free energy is involved? Perhaps *you*, reading this column several months from now, will know the answer. I do not. At my laboratory at the University of Washington we are still carefully monitoring a cell that is electrolyzing heavy water, searching for some indication of excess heat, neutrons, gamma rays, or tritium. After several weeks of this, we have seen no hint of the P&F effect. But we will continue for weeks or months more, until the issue is resolved.

What might be called the "P&F Credibility Coefficient" has gone through wild swings recently. In the past week it (and the stock market) moved in the downward direction. It reached soaring heights of enthusiasm when European laboratories (Hungary, Moscow, Frascati) reported confirmations, and other U.S. laboratories (Brigham Young, Brookhaven, Georgia Tech, Texas A&M, and Stanford) made announcements including some staged press conference spectaculars to announce preliminary evidence in support of the effect. There have been plummets into the depths of depressison as some of these confirming results were discreetly retracted (by Brookhaven, Georgia Tech, and Texas A&M) and as a growing number of other laboratories revealed their inability to confirm the Utah results. Two condensed-matter graduate students from my department at the University of Washington contributed to these P&F mood swings. At a university-sponsored and nationally televised press conference last month they

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announced the observation of a "mass 5 fusion signature" from heavy water electrolysis which they felt might be deuterium-tritium molecular ions from fusion-produced tritium. Several weeks later, after further testing, they submitted a paper reporting evidence that their "signature" was more likely to be a triple deuterium-deuterium-hydrogen molecular ion unrelated to cold fusion. This week at the American Physical Society Meeting in Baltimore, the P&F Credibility Index sank to a new low because of the absence of any confirming experiments reported at the meeting and the detailed dissection of the flaws in the P&F experiment by Prof. Nathan Lewis, a physical chemist from Caltech.

Because of these ongoing controversies and uncertainties and because of the delay between writing and the publication of this column, I can't give a timely discussion of the recent results of cold fusion, so I am stuck with writing about history. I'll start with the physics of cold fusion, then look at past "discoveries" in fusion and other areas, and finally consider the sociology of science as revealed by the present controversy.

Nuclear fusion is the primary energy source of the Sun, where high temperatures and pressures drive the fusion of hydrogen into helium. Here on Earth we would like to make fusion a primary energy source as well, but, with the exception of thermonuclear explosions, we have yet to master the trick. What we would *like* is to bring two deuterium nuclei (1 proton + 1 neutron each) close enough together so that they would fuse, forming a single helium nucleus (2 protons + 2 neutrons) accompanied by the release of about five million times more energy than could be obtained from any chemical reaction.

There are several problems with achieving this. First, both deuterons are electrically charged, so there is a large electrical force pushing them apart. A way must be found to overcome this force and bring the deuterons close enough to fuse. The second problem is that a fusion process must simultaneously obey the laws of conservation of energy and conservation of momentum. Because of this dual requirement, d + d fusion reactions that make helium-3 + neutron or hydrogen-3 + proton should be far more probable than helium-4 + gamma ray. Normal d + d fusion should therefore be a prodigious source of fast neutrons and the secondary gamma rays from energetic protons. In other words, fusion should make lots of radiation.

In the P&F experiment, the energy released would require a speedup of the d + d fusion rate by a factor of about a trillion (the ratio of one dollar to the US National Debt). At the same time, their fusion process would have to make at least a billion times fewer neutrons and gamma rays than would be expected from a normal fusion reaction.

Therefore, to explain the P&F effect we would need the help of the Tooth Fairy (or her equivalent) at least twice. She would have to wave her wand once to make the fusion happen at all, and she must wave it again to make the radiation go away. Some theoretical physicists have explored possible non-Tooth-Fairy mechanisms for doing this. All the proposals seem unlikely. The least unlikely suggests that the palladium crystal

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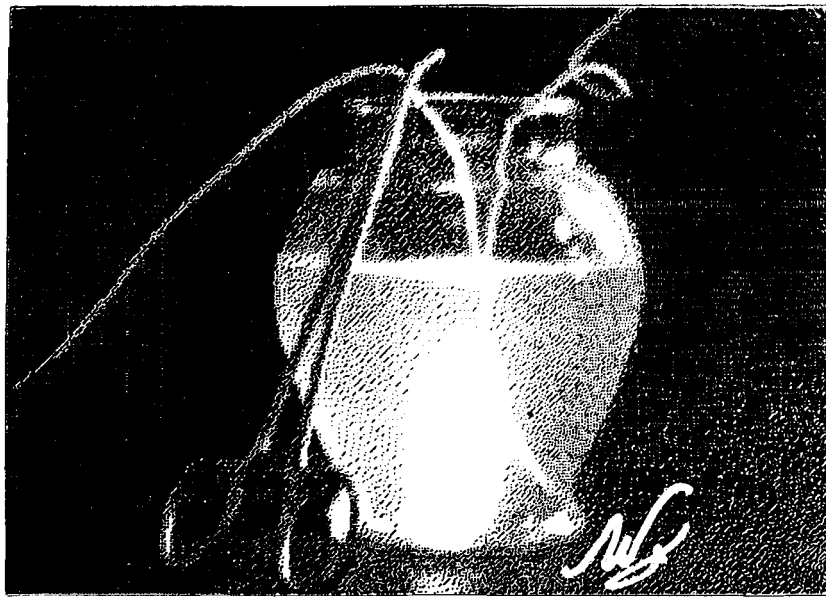

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lattice is somehow bringing the deuterons close enough to fuse and is also absorbing the recoil momentum from the reaction, allowing the produced helium-4 nucleus to receive the full fusion energy. Even this explanation is not consistent with observations, however, because the 24 MeV helium nuclei thereby created should make gamma rays that are not observed.

Controlled nuclear fusion has had a checkered history that does nothing to give one confidence in the validity of the present claims. In 1923 two German chemists, Fritz Paneth and Kurt Peters, revealed that they had achieved fusion using a method very similar to P&F, the electrolysis of heavy water using a palladium electrode. Within a year they published a retraction. In 1951 Argentine President Juan Perón revealed to the world that his protegé, physicist Ronald Richter, had produced "controlled liberation of atomic energy" through a new fusion process. Within a year Richter was imprisoned for having deceived his benefactor. In 1956 Luis Alvarez, who later won the Nobel Prize for his work in particle physics, reported achieving low temperature fusion, using mu mesons, but he later reported that the reaction rate had been seriously overestimated and was not useful for energy production. In 1958 the British Nobel Laureate Sir John Cockcroft announced "he was 90% certain" that controlled fusion had been produced using his ZETA machine. Later he announced that he had been mistaken and that only a very small amount of energy had been produced.

In the history of physics these are only a few of the succession of scientific "discoveries" that proved incorrect. In

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recent times, the announcements of the "discoveries" of superheavy elements, tachyons, "anomalons," magnetic monopoles (twice), and free quarks (twice) have all proved incorrect. These wrong results often involved effects that were barely within the realm of measurability, and many of them required special materials or the use of highly specialized apparatus and techniques that could not be readily duplicated.

The F&P experiment, while seemingly simple and straightforward, has some of these characteristics. Pons revealed recently that one must use palladium rods that are cast rather than extruded or forged, and that even among the cast rods tested, only a fraction show excess heat. He also asserted that the electrolysis must be continued for several months before any release of excess heat can be expected. These requirements makes it very difficult to compare the negative results at other laboratories with the Utah results. Any experiments initiated after the P&F announcement can have been in operation for only a few weeks and many of these have use forged rather than cast rods.

There are other details of the F&P experiment that are controversial:

* Conventional wisdom is that in heat measurements it is important to stir the solution so that the temperature in the solution is as uniform as possible. F&P do *not* stir their solution, arguing that it is not necessary since the bubbles from the electrolysis provided enough agitation. Tests at my own and other laboratories show that this assumption is wrong. The gas bubbles do not mix the solution, very strong temperature gradients are present, and F&P have placed their temperature sensor near the hottest part of the solution. This may explain part of their "extra heat."

* Conventional wisdom is that one should always do a *controlled* experiment, matching a system where the effect is expected against a system where it is not. In the F&P case the obvious choice is to compare the electrolysis of H_2O with that of D_2O, connecting the cells in series so the same current passes through them and adjusting the electrolytes so that they have the same voltage drops. F&P did not do this. Their "control" is a D_2O electrolysis cell with a "dead" palladium rod, one that, for some unknown reason, does not show excess heat.

* Conventional wisdom is that one should measure the electrical power input by multiplying the current through the cell by the voltage drop across the cell. F&P, in computing the input power, do not use the voltage across the cell (and indeed may not even measure it). Instead they use an estimated "representative" voltage drop of about 0.5 volts in their power calculations.

These controversial aspects of their procedures, together with the unusual way in which their results were publicized and their reluctance to allow other scientists to view or test their apparatus, have made it very difficult to take their results at face value. At the APS Meeting it was stated that scientists at Los Alamos National Laboratory, after extensive discussions with Pons, are skeptical of his methods of estimating energy. Work at Harwell Laboratory in Great Britain, where Fleischmann is a consultant, have thus far failed to con-

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firm the Utah results. Time will tell, but the world grows impatient for a believable confirmation of the effect.

Many SF stories often involve the discovery of some revolutionary new physical effect, and SF authors must describe the impact of the discovery on the scientific community, the government, and the public. Whether the F&P effect is true or false, it represents an interesting testing ground for assessing such reactions. In my novel *Twistor*, I described a revolutionary scientific breakthrough that, near the climax of the book, is very rapidly revealed to the scientific community through the use of computer networks. This is a relatively new aspect of scientific communication. After the initial F&P announcement, preprints of scientific papers from Utah, Brigham Young, and other institutions spread like wildfire through the scientific community by means of computer networks and fax machines. Those with networks access had new ideas and new results within minutes after they were put on the nets.

Curiously, the P&F controversy also revealed some fundamental differences in attitude between the community of chemists and of physicists. Physicists, finding the production of fusion energy without radiation too hard to swallow, demanded more information and tended to blame the excess energy on bad measurements and chemical effects (like catalysis of evolved deuterium). Chemists, perhaps placing more trust in the reputations of P&F, tended to scold the physicists for not taking chemical results seriously. They revelled in the vision of a tabletop experiment done in a dishpan by two obscure electrochemists that achieved what billions of dollars and decades of research by an army of physicists working on magnetic confinement fusion and plasma physics had not.

Certain university administrators seemed more interested in securing patent rights, holding press conferences, and lobbying Congress for special grants than in supplying information or facilitating scientific inquiry. Pons and Fleischmann testified before the House Science, Space and Technology committee and requested $25 million to pursue their research. The press, in its characteristic fashion, lavished page space and air time on those with claims of confirmations and new effects while nearly ignoring those who expressed skepticism or caution in accepting unconfirmed results and untested speculations. The Department of Energy, the funding agency for magnetic fusion research, ordered its national laboratories to set up cold fusion research task forces. Industrial firms were, at last report, negotiating with University of Utah officials for inside information on cold fusion.

It all seems very much . . . like a science fiction novel. ■

●There are only two forces that unite men—fear and interest.

Napoleon I

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the reference library

By Tom Easton

The City, Not Long After, Pat Murphy, Doubleday, $17.95, 247 pp.
A Rage for Revenge, David Gerrold, Bantam, $4.50, 518 pp.
Tangled Webs, Steven Mudd, Questar, $?, 248 pp.
Out on Blue Six, Ian McDonald, Bantam, $4.50, 337 pp.
Sugar Rain, Paul Park, William Morrow, $17.95, 384 pp.
Heritage of Flight, Susan Shwartz, TOR, $3.95, 338 pp.
Sphynxes Wild, Esther M. Friesner, NAL, $?, 271 pp.
Novelty, John Crowley, Doubleday, $18.95, 227 pp.
Science Fiction, Fantasy, & Horror: 1987, Charles N. Brown and William G. Contento, Locus Press (P. O. Box 13305, Oakland, CA 94661), $45.00, 417 + ix pp.
Double Your Pleasure: The Ace SF Double, James A. Corrick, Gryphon Books (P. O. Box 209, Brooklyn, NY 11228), $5.95, 88 pp.

The publisher calls Pat Murphy's **The City, Not Long After** "a tour de force of magic realism," meaning an excellent tale in whose world everything seems to make sense and the reality of the story seems to agree with our own, except for certain intrusions of fantasy, of magic, of non-sense. Statues come to life. Ghosts walk the streets of a future San Francisco in a US (and world) devastated by plague, and the city takes sides in a war. It's science fiction, really, with elements of fantasy, what some folks call science fantasy.

The "magic realism" label, I suspect, was invented to make a certain kind of SF&F seem literarily respectable and therefore marketable to those highbrows of the "literary establishment" who would otherwise not deign to notice the stuff. It seems to work, for magic realism, while no better written or crafted than many examples of admitted SF&F, does seem to get a better critical reception in the "mainstream" world. What's more, when an SF&F writer insists on being recognized as a literary giant, irrespective of genre, the lit'ry tastemakers redefine him or her as a magic realist.[1]

So what are we to make of Murphy's book? We can't ignore the publisher's label, for it's there. It's part of the package. Presumably Murphy acquiesced in it. But let's focus for the moment on the story: San Francisco is abandoned except for a colony of artists who arrange miniature villages on courthouse steps, line up dolls in parade, build mirror mazes, paint murals, write poetry, and so on. They use the materials of the city as the components of collages, as canvases, as stages. And they are having a high old time. "Real life" can go hang.

Meanwhile, out in the countryside live a mother and her daughter. The mother, we learn, once aided in the effort to bring the "peace monkeys" from their Himalayan home to all the world's major cities. The legend said that once they left home, peace would come to the world, and so it did, in the form of

[1] My notoriously fallible memory is muttering that this has happened to Gene Wolfe, among others.

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the plague that has brought civilization to its knees. The daughter is nameless because at her birth a golden angel claimed the right to name her, and didn't, then. Nearby, a tyrant is building a small empire in the name of a reborn, "real life" USA. His troops jail the mother, the daughter frees her, she dies, and the daughter heads for San Francisco to warn the locals of the general's plan to annex the city. Once there, she finds that the city itself seems to guide her steps. She sees a tattered, mechanical, golden angel. She finds a house with a Scrabble game set up, and when she closes her eyes an unseen hand turns up a name for her: Jax.

Jax merges her fate with that of Danny-Boy, one of the artists. They become lovers, though here Murphy shows a heavy hand more than once, as when she has Danny-Boy realize that he must let Jax go, and therefore gives her a bicycle. The artists mobilize, and when the army arrives, they defeat them with art, as well as with the apparent aid of the city itself. Even the single shot that ends the confrontation has a poetic symmetry.

Most of the last third of the novel appeared in *Universe 14* (1984) as "Art in the War Zone." At the time, I thought it clever enough, a nice depiction of how the pen (or art) is mightier than the sword. But once was enough. After all, that bit about the pen and sword is such an ancient cliché that it has whiskers. Murphy didn't really need to expand her story into a novel. It's a good novel. It holds the interest. It entertains. It says something. But what it says is trite. What it says seems designed to titillate precisely those who will read "magic realism" but not science fiction or fantasy. And it ignores the obvious truth that communities of artists are by no means necessarily havens of peace and fellow-feeling, for artists are just as capable of militant factionalism as are uniformed paranoids—the chosen weapons may be different, but the war is just as real.

The book is thus for those who take their art far too seriously. And the label on the package only confirms this conclusion.

David Gerrold's *War Against the Chtorr* series has been running for quite awhile. Now he has a new publisher —Bantam—and he's put out revised versions of the first two books, *A Matter for Men* and *A Day for Damnation*, which describe the invasion of Earth by an entire alien — and voracious —ecology. Now he gives us volume 3, **A Rage for Revenge**. Volume 4 is scheduled for Spring 1990.

A Rage for Revenge is an exceedingly didactic book. Gerrold knows it, he warns his readers in an introduction, and he warns his critics that there is nothing inherently wrong with didacticism, only in its use, whether clumsy or exquisite. I can accept that. And I will tell you now that I think Gerrold's didacticism clumsy because there is far too much of it, and far too little actual story.

What? You say the didacticism itself is the story? Maybe so. Consider: Lieutenant James McCarthy is on patrol when he is captured by a Tribe of renegades who live with Chtorrans, eat Chtorran food, and devoutly believe that the only way for humans to survive is by adapting to the invasion, by playing host to the aliens, by submerging their humanity in worship of the new gods. The leader, Jason, is a charismatic fellow whose spiel is that everything that happens to you is *your* fault, because you created the situation in which it happened. He is blameless, and he is an expert at the human potential,

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touchy-feely mind-control game.

Cut to later in McCarthy's life: Now he is in "The Mode Training," more human potential, more apparent mind-control, but this time an official government training program for the leaders in the war against the Chtorr. Its point is to free you of hidden constraints, to make you able to function in full consciousness of what you are doing. It gives *you* control of the agenda. It frees you of the Jasons around you.

Back to the Tribe. McCarthy learns disturbing truths, escapes, and settles into Family, a settlement devoted to rescuing orphans. More mind-control, this time devoted to more humanitarian ends, but still mind-control. The Tribe attacks, McCarthy responds, and the conflict of headgames drives him nuts. He winds up back in government hands just as the decision to nuke the alien monsters becomes essential. Now comes true love and "The Mode Training." McCarthy is in control of his own life. And volume 4 awaits.

I found the didacticism excessive — yes, Gerrold is making a point worth making, but why couldn't he make it more concisely?—but I found something else literally disturbing. In the course of his wanderings, McCarthy does some thoroughly nasty things. He feels guilty about them. And Gerrold seems to be patting him on the back and saying, "There, there. All's fair in war. Anyone who could team up with an alien is no longer human and it's quite all right to waste them." As a biologist, as an SF reader for many years, as, I think, a reasonable person, I find that reprehensible. As Gerrold has painted the Chtorran invasion, the only way for humanity to survive on the planet has to be to find some accommodation with the aliens. Neither total destruction nor desperate flight is the answer. The creation of a new ecology, one with places for both humans and Chtorrans, has to be the answer. This is what Jason's Tribe was saying. This is not what the government is saying with its nukes.

What is Gerrold saying? The books so far move from ignorance toward understanding. He seems to be modeling his approach on Heinlein's famous tendency to follow implications wherever they might lead (and he heads each chapter with quotes from "Solomon Short" as a parallel to Heinlein's "Lazarus Long"). So volume 4 may affirm the value of accommodation, of ecology, of mutual evolution. It just may extend the didactic progression inherent in this novel—Tribe, Family, Nation—to world, species, and even sentience. But we'll have to wait and see.

In the meantime, enjoy the limericks. The book is full of them, perhaps for comic relief, and many of them are absolutely filthy. Some of them are even hilarious.

Steven Mudd's **Tangled Webs** is promising, for though the writing is uneven, it is often very deft and effective, and if the novel bears a considerable burden of genre cliché, it adds to the clichés a certain freshness, a sense that villains can be retreaded and that evil is rarely purely black. In the distant future, a star-spanning tyranny has been forged by reconnecting the scattered worlds of humanity. The job of reconnecting is not done, and there are still inhabited worlds that lurk Beyond the Periphery of the Interstellar Union. Triune Adjudicator Phillips is intrigued when, on his incognito vacation on the Periphery, he meets someone who not only claims to be from such a world but demonstrates unusual powers by destroying cyborgs sent to arrest her.

The tale jumps then to Drinan IV, the

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headquarters world for Sector 7, where a paranoid security chief is arrested for his brutal excesses, sentenced to death, and told that he can save his life by becoming an undercover agent and continuing to pursue threats to the Union. Jump again to the world of Bekh-Nar, where Overseer Selius is showing an unusually gentle hand in her efforts to bring the locals into the Union. Jump to Phillips, twenty years later, who is feeling the enmity of the ambitious chief adjudicator, Rizlov, while Selius faces a court martial and secret agents have begun to sniff along an alien trail. Watch everything come together, watch the victory of good as Phillips and Selius are saved, watch the omens build as the agents close in, and then . . .

The end is a cliff-hanger. It's a good one, too, the sort that makes the reader eager for the second volume in the series. And *Tangled Webs* is good enough to make me think that the second volume may be better written, better told, more satisfying. I'm looking forward to it.

Ian McDonald made a good impression with *Desolation Road*. Now, with **Out on Blue Six**, he's as ambitious as ever, but distinctly less successful. The problem begins with the reader's sense that the street-jive is a lackadaisical imitation of Norman Spinrad's. It gets worse when McDonald's intricately constructed society proves to have none of the essential underpinnings.

Consider: After the Break, when catastrophe finally overwhelmed the human species, society's survivors turned themselves over to the computers with a single prime directive: Keep us from pain. The result is a billion or so people crowded into the single great city of Great Yu, where the Compassionate Society is run by bureaucrats assigned to their jobs not on the basis of talent or inclination but because the computers think those jobs are the ones that will make them happiest, where satire and all other disruptive influences are forbidden, where . . . Yes, it's utopia for those who don't think, whose desires reach no higher than warmth, food, sex, security.

But for Courtney Hall, cartoonist, would-be satirist, artist who craves the driving burr beneath the saddle, it's hell. Happily, she falls in with the King of Nebraska, mad ex-figurehead, and his retinue of biochip-boosted raccoons, and sets off on a journey to the edge of the city, seeking whatever may lie beyond. Meanwhile, Kansas Byrne, Raging Apostle of guerrilla art, meets Kilimanjaro West, incarnation of the machine-god Yah who has taken the flesh-walk to see if humanity is perchance ready to take its own affairs in hand at last. And in due time, everyone gets together, a gathering of saviors, and humanity is free! *Ad astra!*[2]

It's mordant satire, intricate, well crafted, alive with original characters and zany touches, a few of them so clever—the Statue of Liberty foundered in an ultimate cesspool, displaying what the Compassionate Society has surrendered in its search for freedom from pain—that I wonder how McDonald can stand himself. It's a virtuoso display of wild imagination. So what's the problem? Why do I have to make cracks about missing essential underpinnings?

Great Yu is an urban colossus, nothing but concrete and steel stretching for miles and miles and going deep into the earth. It is, find Ms. Byrne and the King of Nebraska, surrounded by a wall.

[2] No, I'm not being entirely facetious.

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Outside the wall is a toxic wasteland, a sea of sewage and chemicals and Styrofoam bits and garbage and stomach-turning mutants. So where are the farms? The mines? The recycling that we know now is essential for *any* workable future?

Well, Great Yu taps the planet's core for energy. Given cheap enough energy, no problem. Just pluck your magic twanger, Froggy, and . . . But a core tap ain't cheap, folks. Let's get real.

Unless you think reality is irrelevant to satire. In which case, enjoy.

Here's another imitation, not of Spinrad, but of Brian Aldiss in his Helliconia mode, and again the imitation is weak, pale, destined for the ash can of literary history while the original goes on and on. It's Paul Park's **Sugar Rain**, second of the *Starbridge Chronicles*, set on a world with a 220-year year, home to a humanity whose civilization is shaped by cycles of long, long seasons and ruled by the Starbridge clan. That clan uses a rigid caste system and powerful theocracy to enforce its position, but spring is coming, the people are rising, and the old order falleth. Park thus has immense potential for drama and melodrama. And he wastes it.

Most obviously, he wastes it by insulting the reader's intelligence with such idiocies as the idea of mining glass in forty-foot sheets and the claim that solid silver flows. More subtly, he fails to pursue his own premises with the rigor they deserve, as when he lets his characters far too routinely cover up and forge the elaborate tattoos that govern the caste system. And there's more, enough more to keep me from recommending this one even to satire fans, so much more that I—even I!—couldn't get past the first third of the book.

* * *

You saw parts of Susan Shwartz's **Heritage of Flight** in these pages. Other parts are new to this novel. Together, they tell us of a future interstellar civilization that has blockaded Earth and then split to fight a vicious war. One side, the Alliance, fears that the war will destroy the species and decides that it would be wise to plant a colony of refugees and assorted technical specialists on an uninhabited world, there to lie low and survive the war as "seedcorn." If all others die, they will multiply and replenish the species.

Sadly, the chosen world, Cynthia, is inhabited by intelligent moth-like aliens whose meter-long larvae devour everything they meet upon the ground, including humans. The colonists defend themselves by destroying the Cynthians, and the bulk of the book concerns how they come to terms with the resulting massive guilt complex, first by accepting a marooned enemy pilot and then, when Earth finally breaks its blockade and grabs the warring factions by the ears, by offering themselves up for trial as genocides. The result is a group of humans who, having acquired an enviable sense of sanity and responsibility, promise that the future has some hope of being as humane as humanity's ideals.

It sounds good, doesn't it? Alas, Schwartz cuts her own authorial throat in so many ways that you may find it difficult to get very far into the tale. For instance, when her colonists look up from their first campfire and see the Cynthians flying overhead, the instant reaction is, "Look! Intelligent natives!" There is no faintest hint of intelligent behavior to justify jumping to this con-

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clusion. For another instance, the Cynthians are the only animal (except for a pest introduced in Part 2) in the local ecology—no herbivores, no carnivores, not even any insects—and no one notices.

To such things add annoying inconsistencies such as: On p. 54, the heroine has no gun; on p. 58, having gone nowhere and picked up nothing, she has one. On p. 270, the Earth pacifist "Neave ordered the weapons systems disabled"; on p. 272, "here [Neave] was, commanding . . . a ship. Others would fly it, and fire—better yet, *not* fire—the weapons," clearly indicating that the weapons were not disabled. Add to this the evidence of technical ignorance and sloppy research embodied in the ideas that any animal that has antennae must communicate by radio (" 'Look at the antennae on those creatures! . . . Set the receptors for high frequencies.' ")[3] and that bioluminescence is due to a reflective pigment (rather than to a substance that glows with its own light).

Sigh. I've met Ms. Shwartz. She's intelligent, educated, and personable. But, she's a humanist (with a Harvard Medieval Lit degree), not a techy, and that may explain part of the problem. As for the rest, she may just need better editing.

Esther M. Friesner is also a humanist (Vassar and Yale), but she does a better job with **Sphynxes Wild**, perhaps partly because she has chosen to deal in fantasy. This one is a sequel to *Elf Defense* and *New York by Knight*, but don't make the mistake of expecting it to be as funny as those two. Friesner has chosen to be more (but not at all totally) serious this time out.

The story centers on the sphinx of classical fame, the one with the riddle. Defeated once, but not killed, only weakened, she became the captive of a Roman wizard. Immortally together, they wound up in Atlantic City, where she escaped, became the head of a gigantic corporate (licit and illicit) empire, and began to plot the destruction of humanity with the supreme Riddle. Enter Sanchi, the boy who once served as squire to a knight and helped destroy a dragon. He is grown now, on his own, working in a casino owned by the sphinx. His no-good half-brother Alonso is sent to him. His foster family pursues him, first in the person of Elena, once the little sister, now grown and lovely and . . . Enter the sphinx and her scheming manipulations; she is a destroyer, a heart breaker, a wrecker who entices Alonso to the corruption of her bed and then, just to complete her collection, beds Sanchi as well. Enter the wizard and his noble aim to save the world; he calls Hades for help, fails to be specific, and gets seven Caesars, an Egyptian queen, and a gossipmonger.

And the plot marches on. The gods of the Caribbean come to help, the sphinx exposes all her Riddles, Elena proves equal to the sphinx's challenge to her capacity to love, and in the end Sanchi succeeds as well as she. The theme is love in many guises, and Friesner handles it so well that she convinces

[3] Yes, there is some suggestion that the Cynthians might communicate by scent, but the magic word "antennae" soon drives out that bit of sensibility.

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me that if she ever chooses to abandon humor entirely, she will have no problem at all in earning great praise for her work.

No, I am not saying that because she uses humor, her work is less worthy. But let's face it: So many people do take that attitude that it is hard for a humorous writer, no matter how pointed her humor or how profound the thoughts embedded in her humor, to be taken seriously.

John Crowley's **Novelty** is a collection of four novellas, one of which, the novella "Novelty," self-referentially concerns a novelist groping for an idea for a novel. And if you think that's an awkward sentence, it at least points up the play on words of which Crowley is guilty here. Not that plays on words are anything new for Crowley. He's a serious literary fellow, he is, and he can be quite densely allusive, as in "In Blue," a tale of life in a future that has abandoned all the past as irrelevant yet must live as always among the ruins. Then there's "Great Work of Time," in which he plays with the idea of protecting the British Empire by manipulating time; this, because nothing he says seems very new, is probably the least of the book's tales. The best may be "Why the Nightingale Sings at Night"; it is a tale of the creation of both the world and art, and it makes the point that the artist successfully stands out by finding some venue in which he or she can be "the only one who sings"—"It was the only new idea the Nightingale had ever had, and he never had another one."

Here, perhaps, is a good example of what a decent writer does. He or she does not simply tell a story, but codes some statement, message, or interpretation within the tale. Those who tell *only* story can be dismissed as trivial, and usually they are. Homer does not live today because he told a great war yarn, but because of what he said about human folly.

Once more, Charles N. Brown and William G. Contento have pumped the computerized files assembled (partly) in the course of publishing *Locus* (the premier newsletter of SF and fantasy; order it from Locus Publications, P. O. Box 13305, Oakland, CA 94661; $28 for 12 issues in the US) to give us the exhaustive **Science Fiction, Fantasy, & Horror: 1987—A Comprehensive Bibliography of Books and Short Fiction Published in the English Language**.

The title says it all. And you just have to have it, don't you? If, that is, you're a scholar, anthologist, librarian, or collector. So buy it, and note that similar volumes for 1985 and 1986, as well as an *Index to SF Anthologies and Collections: 1977-1983*, remain available. Coming attractions include bibliographies for 1984 and 1988.

The rest of you, subscribe to *Locus*.

Do you have fond memories of the late, lamented Ace Doubles? So does James A. Corrick, who not only owns every single one of the things but has compiled a small monograph, a short bibliography, and an exhaustive list (leaving out the westerns and mysteries

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which Ace also published in the Double format). The resulting pamphlet is available as **Double Your Pleasure: The Ace SF Double** from Gryphon Books (P. O. Box 209, Brooklyn, NY 11228).

Gryphon is a small house that doesn't seem to put much shine on the product—*Double* amounts to 44 8.5 × 11 inch sheets, covered with print that surely emerged from a daisy-wheel printer, folded in the middle, and stapled in the crease—but it does keep the price fairly low to give you things you can't find elsewhere, from bibliophiliana to reprints and take-offs. Its focus seems to be the pulps, both SF and mystery, and the price list says that 1989 will see *Sherlock Holmes: The Great Detective in PB*, by Gary Lovisi.

ANADEMS

Trust you, Dear Readers, to do your durnedest to inform me. Willis H. Bledsoe, Colonel (ret.) US Air Force, Lamar Peeples, Major (ret.) US Air Force, Kevin Kelleher, Loren K. Wiseman, Clyde Wilkes, Charles H. Chandler, and D. C. Lacy have written in connection with my skepticism about the portrayal of air-borne radar and an automatic, target-tracking fire-control system in a 1944 B-29 in Bill Forstchen's and Greg Morrison's *The Crystal Warriors*. The consensus seems to be that, yes, the radar was there, though it was aimed mainly and most effectively at the ground, not at enemy fighters. The fire control system existed too, though it wasn't quite as automatic as the book suggests; according to Lacy, gunners aimed sights that were slaved to the guns elsewhere in the plane. The central fire control device handled the slaving.

So. Maybe I jumped on the authors a wee bit too hard. But they certainly do seem to have been guilty of a little excessive modernization.

Thank you, all. ■

IN TIMES TO COME

● Our next issue is this year's "extra," the one called Mid-December. Its lead story, with a cover by Todd Cameron Hamilton, is W. R. Thompson's "Varmint," which has a lot more to say about the background of this month's "Maverick." In "Maverick" you read about the vaults left on planets here and there by an ancient and unseen race—but you didn't learn *why* the vaults were there. Next month is your chance—and be warned that both the builders and their motives may seem more than slightly alien.

There are two stories that might be considered Christmas stories, though I don't mean by that quite what you might think I mean—and in any case the two are very, very different. One, by *Analog* regular Rick Shelley, involves nanotechnology and elements of both wish-fulfillment and horror—but how much of each? The other, by new writer Maya Kaathryn Bohnhoff, involves no new hard technology at all, but does set forth a sociological experiment that might be worth trying. We also have a new story by Michael McCollum (who hasn't appeared here in *much* too long), an unclassifiable special feature by Poul Anderson, and an article by Stephen L. Gillett, Ph.D., on what those unpopular innermost planets might be good for.

Please note also that the Mid-December issue is when we'll be asking you to vote on your favorite stories, articles, and covers for the annual Analytical Laboratory. Feel free to start looking over back issues. . . .

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brass tacks

Dear Dr. Schmidt,

I am deeply disturbed by the Alternate View column (March 1989). In his zeal to refute the ecological doomsayers who see extinction at every turn, author G. Harry Stine blithely dismisses very real environmental concerns.

It is impossible to give a detailed reply to the misconceptions and fallacies in Stine's article, but I will point out some of them. For more depth on these topics, I would refer readers to recent issues of *Nature*, *Science*, *National Geographic* and similar reputable publications. Readers will find that contrary to Stine's assertions:

1) The Antarctic ozone hole is a very dramatic and poorly understood phenomenon. It is the opinion of experts in the field (presumably they, like Stine, have not thrown away their chemistry textbooks and can be believed) that the hole is due primarily to man-made chlorofluorocarbons. The data are so convincing that major chemical manufacturers have voluntarily abandoned this lucrative business. A decrease in the ozone layer is dangerous to those of all skin color, not just whites as Stine suggests. It is also hazardous to other animal life.

2) The so-called greenhouse effect is also of real concern. The phenomenon has certainly not been proven, nor was last summer's drought a result of it, but there is real concern in the scientific community on the topic. Stine's suggestion that the theory is simply the result of the congressional testimony of "one lone person that I have never heard of before" is simply incorrect.

3) The impact of humanity on the planet's genetic diversity is profound. Stine says that some 50 species will become extinct in the twentieth century, about the same as any other hundred year period. This number is ludicrous. Projections indicate that as many as one *million* species may become extinct in the next 25 years due only to the destruction of the world's rainforests. In addition to the species that are becoming extinct, many more are finding their habitats greatly diminished as humanity encroaches on wilderness areas.

As far as the rest of the world's biosphere is concerned, humanity is a far worse disaster than any volcano, comet, or ice age. Stine is correct in belittling those who cry "doom" without scientific basis or understanding. These people distract us from the real issues of concern. It is just as bad, however, to deny the existence of real problems or potential problems. Stine is guilty on this last count and has done a real disservice to *Analog* readers who are trying to distinguish science fact from the pseudo-scientific propaganda being blown about.

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Dear Dr. Schmidt:

I had to write to comment on G. Harry Stine's "Alternate View" column in the March issue. He may believe that we're "not going to hell in a handbasket," and I think that that's certainly a position worth arguing, but to deny all evidence of the greenhouse effect and ozone depletion is to deny scientific

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observation. At the same period I was reading his ravings in *Analog*, I was reading articles in *Science* magazine on further evidence on general global warming, and observations of an Arctic ozone hole of the same type observed over the Antarctic in the last few years. Since the Arctic is an ocean surrounded by continents and the Antarctic is a continent surrounded by oceans, it stands to reason that there would be differences in the ways that pollutant chemicals affected the ozone layers. The point is that the scientific evidence through observation shows pretty definitely that ozone depletion and greenhouse warming due to atmospheric pollution are taking place.

If Mr. Stine's point was that we still don't have a clear and definitive picture of how it all fits together, and the time scales involved, he's right. But that's not the sense I got from his article. To deny that there's any hard data and to ignore atmospheric pollution as the doom-sayings of environmentalists and liberal politicians is to deny reality and to ask for the very doom that I think we'd agree isn't inevitable, merely strongly probable unless we modify some of our current practices.

CHARLIE IRWIN

Cambridge, MA

Dear Dr. Schmidt,

I have a problem.

I have been reading science fiction for 55 years, and the enchantment seems to have worn off; the magic has gone away. I now find myself giving up on a novel after a few chapters, turning to the next short story after the first page—even in *Analog*.

I realize that this may be because I'm getting older. "The fault, dear Brutus, is not in our stars but in ourselves . . ." as Cassius remarked.

So: is it science fiction that has changed, or is it me? I decided to do an analysis of science fiction, of the stories which I particularly liked. My recollection was supported by the printed word.

I began reading science fiction with E.E. Smith's *Triplanetary*, in *Amazing*, 1934: the same year that both *Skylark of Valeron* and John Campbell's *Mightiest Machine* appeared concurrently in *Astounding*. And the following year saw Jack Williamson's *Legion of Space*.

So, although I did not start in the Gernsback era, I did begin early enough to have read all through the golden years; to have seen both the first stories and the full flowering of the grand masters of the craft: Asimov, Heinlein, Clarke, DeCamp, VanVogt, Anderson, Dickson —to name but a few.

The stories I chose were both *memorable* and *rereadable*; stories which I not only remembered enjoying but which I had reread several times.

Did the stories in my sample have anything in common; and was this commonality to be found in the fiction of today? My study yielded four touchstones of excellence. The first two are scientific or science-fictional; they spell out what to me are the indispensabilities of the genre.

1. There should be useful, ingenious, and hitherto unknown mechanisms or applications of science. Biological, genetic, even social engineering applications are acceptable. I just ran across a frightful word—"gengineering": a word which, to my mind, calls for washing out the mouth—or the word processor—with soap and water or some other appropriate cleansing fluid!

2. The scientific theory behind the ingenious mechanism should be consistent and clear enough that the reader has the illusion that he understands what the devices do and how they do it. The theory can be orthodox, building on and

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extending the knowledge of today. John Campbell, when he was writing, was an expert at this; as was Hal Clement, Larry Niven. But orthodoxy is not required. The Skylark stories, the Lensman series, were quite unorthodox. Indeed, despite those who toss tachyons about, or dive into worm holes in space, I most seriously doubt that mankind will ever get beyond the Solar System until physics becomes stranger than we now dream of.

The next two criteria are literary. They fit any fiction which I find both memorable and rereadable.

3. I insist on at least a few interesting and likeable characters; people I might enjoy talking with in the neighborhood pub. No anti-heroes, please!

4. The culture, the future or alternate civilization in which these people act should preferably be one that would be pleasant to visit, even if briefly. If it should also be one where I might like to live, so much the better. The so-called "dystopias" are therefore out. I have not and do not expect to reread Orwell's *1984*. Examples? E.E. Smith's *Skylark Three* shows true gold by the first two touchstones; and Poul Anderson easily meets three and four: particularly, I would say, with his *People of the Wind*.

What of today?

Rather bleak, I fear. The great writers seem largely to have abandoned the field. And, perhaps, should have done so sooner. Heinlein, once the grandest of the masters, over-filled his last books with his own personal version of the *Playboy* philosophy, in which all things were possible, left nothing to be astounding, amazing or wonderful. I rather wish Asimov had left the Foundations, First and Second, alone; and one *2001* from Clarke was quite enough. Anderson seems to have decided to become "creatively anachronistic," to have turned to mythic history.

I can only think of two new writers who satisfy me. Brin's *Startide Rising*, and Busby with his stories of Rissa Kerguelen. These hark back to the Heinlein of the great Campbell years. Unfortunately, neither is all that prolific.

I would add that I have not found this disenchantment with my other form of "escape" reading—the detective story. I can no longer follow Peter Wimsey, or Hercule Poirot, or Roderick Alleyn as they solve their cases. But the classic English detective story is still with us, still flourishing, still following Ronal Knox's Ten Commandments.

And so, I issue a challenge to writers, to editors, to publishers: give me, please, some new stories in the old vein.

Perhaps this is too ask to much.

Perhaps I must reconcile myself to reading new mysteries, and rereading old science fiction.

A. ARTHUR SMITH, Ph.D.
3225 St. Patrick's Drive
Windsor, Ontario Canada N9E 3H2

Dear Stan:

I am writing in praise of Warren Salomon's article in the May 1989 issue of *Analog*. Even more curiously, I disagree with a lot of it! But Warren has distinguished himself by trying to work out a *consistent* setting for interstellar travel. That is, interstellar travel, just like any other technology, must fit into the societies using it. I began writing my own *Analog* articles, which I hope very much to continue, because I wanted to *think out* just what the future would be like.

Thinking it out doesn't mean simply postulating a technology. *Everything* must fit together. I liked Warren's analogy to the fictional society with well developed mass transit to Antarctica!

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For those who would like to know, I disagree because I think interstellar travel will not follow the analogy of interplanetary travel. Once we have fully developed interplanetary travel in an extremely wealthy interplanetary society, the step to interstellar travel is more like teenagers souping up a hot rod than like a major research project. But that point needs much more argument than I've given it here.

THOMAS DONALDSON

The author replies . . .

That's one of many points I didn't discuss in the article. My own view is that interstellar travel will probably develop well *ahead* of interplanetary travel. Other than the asteroids, where the next century's gold rush will be, there's not too much around here to interest us. Why bother with terraforming Mars, when there are probably lots of usable worlds out there, just waiting? We can get rich going to the stars, or we can get bogged down with expensive boondoggles closer to home. The choice is obvious.

WARREN SALOMON

Dear Stan,

I thought Marc Stiegler's article "Hypermedia and the Singularity" (*Analog,* January 1989) was terrific. Marc said so many important things so well that this fan doesn't know quite where to begin in commenting on it.

The problem of "linearization" is something I'm facing right now. If you're writing SF in 1989 for a linear medium, how do you realistically represent the written materials that appear in a story?

Marc's points about bureaucrats are very well taken. It is discouraging (but entirely understandable) how some people have used all the improvements in communication just to increase the red tape burden. Oh well. I think we've got this far because the producers in our world have been able to produce beyond the wildest dreams of the red tape folks.

Marc credits me with introducing the notion of a technological "singularity," a point where the trends in Artificial Intelligence and/or Intelligence Amplification produce people with greater-than-human intelligence. Beyond this point, it's intrinsically impossible for us normal types to make credible predictions. Well, I may be the first person to say it in just those terms, but I got the most remarkable letter from Neal R. Wagner at UT San Antonio. He pointed to a passage from Ulam's tribute to John von Neumann (in the May 1958 issue of the *Bulletin* of the American Math Society):

"[von Neumann] once expressed an apprehension that the values put on abstract scientific achievement in our present civilization might diminish: 'The interests of humanity may change, the present curiosities in science may cease, and entirely different things may occupy the human mind in the future.' One conversation centered on the ever accelerating progress of technology and changes in the mode of human life, which gives the appearance of approaching some essential singularity in the history of the race beyond which human affairs, as we know them, could not continue."

Given the context, it appears that von Neumann does not quite see the same cause for the singularity as I do. (Technical progress without greater-than-human intelligence would lead to a quite intelligible era, in my opinion. See, for example, Gunther Stent's *The Coming of the Golden Age: A View of the End of Progress,* Natural History Press, 1969). Nevertheless, I've lost first claim to the usage.

VERNOR VINGE ■

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a calendar of analog upcoming events

30 November-3 December
POLCON '89 (Polish national SF convention) at Gdansk, Poland. Guests of Honour—Brian Aldiss and Kir Bulychev, Artist Guests of Honour—Michelangelo Miani and Theodore Rotrekl, Fan Guest of Honour—Charles N. Brown. Registration —US$84 attending (includes registration, room and board plus siteseeing in Gdansk), US$15 supporting. Info: Gdanski Klub Fantastyki, ul. Chylonska 191, 81-007 Gdynia, Poland. Include sufficient International Reply Coupons for airmail reply.

1-3 December
TROPICON 8 (South Florida SF conference) Fort Lauderdale area, Florida. Guest of Honor—Lynn Abbey, Fan Guest of Honor —Leslie Turek, TM—C.J. Cherryh. Registration —$20 until 1 November 1989. Info: SFSFS Secretary, Box 70143, Fort Lauderdale FL 33307.

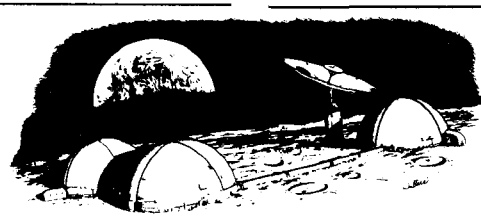
8-10 December
SMOFCON 6 (The convention runners' conference) at Howard Johnson Airport Hotel, Toronto, Ont. Registration—C$40/US$32 until 30 October, C$50/US$40 at the door. Info: SMOFCON 6, Box 186, Station M, Toronto ON Canada M6S 4T3. (416)232-0294 (1900-2200 EST).

23-27 August 1990
CONFICTION (48th World Science Fiction Convention) at Netherlands Congress Centre, The Hague, Netherlands. Guests of Honor—Joe Haldeman, Wolfgang Jeschke, Harry Harrison; Fan Guest of Honor—Andy Porter. Registration—$65 until 31 December 1989. Supporting—$28 until 31 December 1989. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: Worldcon 1990, Box 95370, 2509 CJ The Hague, Netherlands. Enclose sufficient International Reply Coupons for airmail response.

30 August-3 September 1990
CONDIEGO/NASFiC (North American SF Convention) at the San Diego Omni Hotel International, San Diego, Calif. Guest of Honor—Samuel R. Delany, Fan Guest of Honor—Ben Yalow. Registration—$65 until 1 January 1990, $75 thereafter, $85 at the door. Info: ConDiego, Box 15771, San Diego CA 92115.

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Offices six months in advance of the event.



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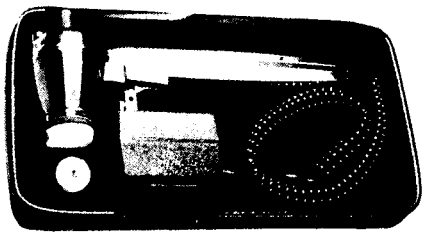

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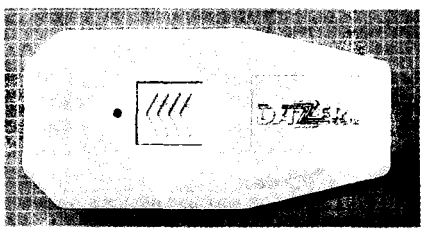

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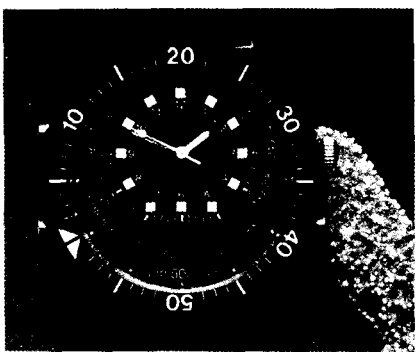

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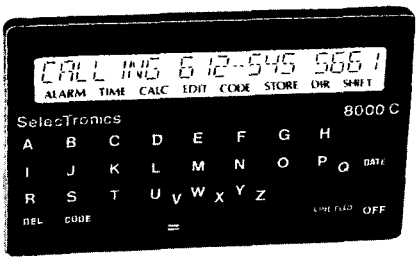
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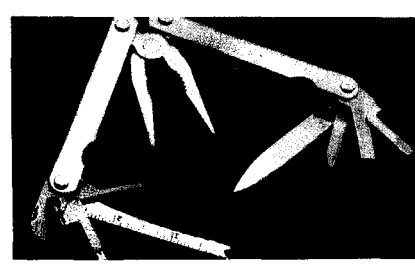

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